

CHAPTER 21

The Self and Its Memes and Genes: Genes, Memes, Self, Brain, Information and Consciousness

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INTRODUCTION

The Statement of Position

Let me begin with a poem of mine, published in 1987:¹

Do you know who am I?
I am He, whom the sun cannot dry!
 The fire cannot burn,
 Nor a sword ever churn;
Never was I born
Never do I die.
Do you want to know more about me?
The omnipresent, omniscient, omnipotent 'He'.
 Absolute truth, perfect and pure
 Infinite pleasure, whom none can injure,
The eternal, the immortal,
I am ever free.

*I wholeheartedly appreciate the decision of Professor Pradip Sengupta to invite me to write this paper. I almost refused the offer because of my other preoccupations when my eldest daughter Tapasya (student of class X in 2004) insisted that I should accept this challenge. It was a rhythmic thrill to travel through the terrain of the specific thrust area of this paper. While on the job, I enjoyed full support from my mother, my wife Chitrani, son Anindya and youngest daughter Amrita. While I was making the draft, there were several rounds of discussion with Dr Taranpreet Saluja, MD, and Dr Rashmi Dube, MD, Dr Naveen Gupta, Dr Indranil Dhar, the resident doctors in the department, Dr R. Siva Kumar, Ph.D., and my nephew Bitihotra Chatterjee who has just completed his BE (electronics) from Jadavpur University, Calcutta. The young mind's meaningful queries have strengthened several of my insights during writing. I gratefully acknowledge their participation. I also take the opportunity to thank Mrs Pooja Taneja for her secretarial assistance.

Still unsatisfied? Do you want to know much more?
 Do I live in the wicked, sordid and in the sore?
 Then, let it be known to all –
 I vibrate in every great and small,
 The holy or sinner, the heaven and the hell,
 I vibrate in all, in unparallel spell.

From the chains and bonds, make yourself free,
 Turn your face, just towards Me
 Get the touch of infinite 'I'.
 Inexhaustible fountain, none can dry!
 Everything struggles for metamorphosis into 'Me'.
 Unified oneness, to realize and see.

I manifest as 'Love', the captivating peace,
 Absolute Existence, Knowledge and the Bliss.
 I am in all and all are in Me
 I am in those, what you can't see.
 All-pervading 'I', never should you miss,
 I manifest in 'Love', the captivating peace.

The vibrations emanating from the piece of poetry reflect the Upaniṣadic truth, iterated again and again since the first realization of oneness of human consciousness, self-consciousness and universal or transuniversal consciousness. This has been reiterated in the *Bhagavad Gītā* and has been conferred cultural legitimacy by independent realization of innumerable mystics across the spectrum of religions.

I am not thought. Thoughts are mine. I am not idea. Ideas belong to me. I am not the archetype. I am the creator of archetype. I am not information. All information is generated from and dies out in me. I am not merely confined to sensation, perception, conception and experience. Sensations, perceptions, conceptions and experience are mine. I am not the genes. Genes belong to Me. I am not the product of genes. I dwell in genes to develop the gene products. I am not the planet, star, galaxy or universe. All universe(s), galaxies, stars, planets belong to me. I am not constrained by any paradigm or worldview. All paradigms or worldviews belong to me.

This could be our stated position for handling genes, memes and 'self'.

Consciousness is the ground reality, which sometimes gets embodied in a person and is expressed with a capital 'I'. 'Self' is the individual unit of consciousness and is expressed as small 'i'. The meme is the unit of thought. The gene is the unit of heredity. Information is the unit of the message of communication. Our approach is, therefore, an embodied approach. With this embodied approach, we shall discuss the thrust area of this essay, 'The Mechanics of Molecular Biology and the Principles of Individuation: Genetic Uniqueness and Personal Uniqueness.'

A BRIEF SKETCH OF INDIVIDUATION

We may begin the story when an individual is conceived as a zygote by following fertilization of the ovum from his/her mother by the spermatozoon from his/her father. The sperm's

head (containing the father’s genes) enters the ovum and fuses with its nucleus (containing the mother’s genes). The ovum contributes other organelles (the most important ones are mitochondria) to the zygote.

A series of cell division follows resulting in a group of totipotent cells (morula), three germ layers with pluripotent cells and the multipotent stem cells for genesis of organs. Differential gene expression from genetically identical nuclei is held responsible for the genesis of different cell, tissue and organ types.

The heart is formed at three weeks after conception. Clinicians, with ultrasound equipment, can detect its beat by 8–10 weeks of intrauterine life and the heart sound becomes audible through the stethoscope by 18–20 weeks.

From 15 weeks of gestation to two years of post-natal life is the crucial period for development of the brain. Deficiency of any important micro-nutrients (e.g., iodine) during this period could cause irreparable damage to the brain.

Science has not yet accepted the existence of ‘soul’. Different religious schools differ in their views about when an individual starts possessing a ‘soul’. It may be when the heart starts beating, or when the brain is formed, or when the baby gains the ability of independent survival.

After completion of ten lunar months in the uterus, an individual is born on this planet. Self-consciousness (awareness about ‘self’) develops when the baby is around six months to one year of age. He learns to crawl, stand, run, goes to school, gets educated. He grows in the family and the society representing a particular socio-cultural milieu. Social interaction and working together contribute to the development of necessary language and consciousness, and shape his awareness and motivation in a definite direction. His emotion and instinct, intention and intellect make him an experiencing individual to formulate strategies and tact. He begins his own mission either individually or in a group through organized systems and institutions.

Individuation is thus a gradual development and results from interaction of (a) genes (b) consciousness and its vehicle, the brain, (c) ‘ideas’ indoctrinated in the brain (‘memes’), (d) socio-economic-cultural pressure and (e) ecological influence (see Fig. 21.1). The ecosystem, in the present scheme, includes all depths of nature and consciousness.

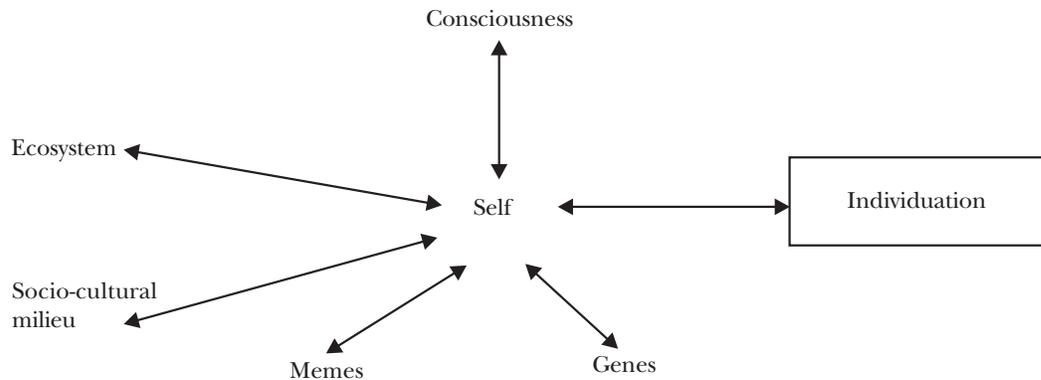


Fig. 21.1 The process of individuation

Different Approaches to Individuation

Neural behaviourism (we are nothing but brain reflexes), genetic behaviourism (we are products of genes) and mental behaviourism (we are what our thoughts are) are according to the stated scheme, therefore, incomplete individually and even when they are put together. The view that 'I am self' or 'we are what our selves are' may be phrased as mystical behaviourism. This appears all-inclusive, but in reality it is a view suspended in the middle leaving consciousness at the top and the genes, memes and the brain at the bottom. Behaviourism of self-organizing system lays emphasis on organization and does not adequately address the behaviour generated from the 'self' particularly in the context of its relationship with consciousness.

Cordial Relation Between Consciousness and Self Helps in Overcoming Three Traps

The 'self' is incapable of emerging independent of the 'time trap', 'mind trap' and the 'death trap' unless it reinvents its actual relationship with consciousness.

Four Facets of Individuation

There are four facets or aspects in individuation. An individual is objectively characterized by his/her behaviour. The interior of a formed individual could be assessed by his intention. Consciousness has a major role in shaping the intention. Intention expressed is behaviour. Intention and behaviour are not absolutely unitary. The individual is placed within a collection of other individuals called society. Like an individual, the collective works with some explicit patterns known as social behaviour while within the collective runs implicit cultural norms. Both individual and the collective are embedded in the nested ecosystem of nature and consciousness.

Five Components of Individuation

The process of individuation is complex and is extremely difficult to simplify. It is a result of a complex interaction of five components, namely, genes (the unit of heredity), memes (the supposed unit of thought), self (the individual unit of consciousness), information (the unit of a message), and consciousness, which forms the ground reality.

There exists a hierarchy within these five components. Genes form the rock bottom, the basic. Memes occupy the mental domain. The 'self' is considered an indivisible and a specifically informed 'spark' of unconditional consciousness. The 'self' is conditioned by the 'ideas' (memes) it transacts with. The gene quota through which it can play and manifest restricts it. The common point of self, genes and memes is their informational openness, which varies in degree and happens in certain specific circumstances. Information transaction occurs individually in each of the three and also it takes place between the three. The self can act on genes and memes. Genes could influence memes and self. Memes could alter conditioning of self and influence the expression of genes. Through information, self, memes and genes could communicate with the surrounding ecosystem and with the socioeconomic-cultural milieu (Fig. 21.2).

Four Perspectives of Individuation

Genes, memes and information offer a pre-personal perspective and form the base of individuation. It is 'self' that begins crystallizing the personal aroma. The person, the individual, is within and is an indivisible constituent of the 'collective'/whole and is to

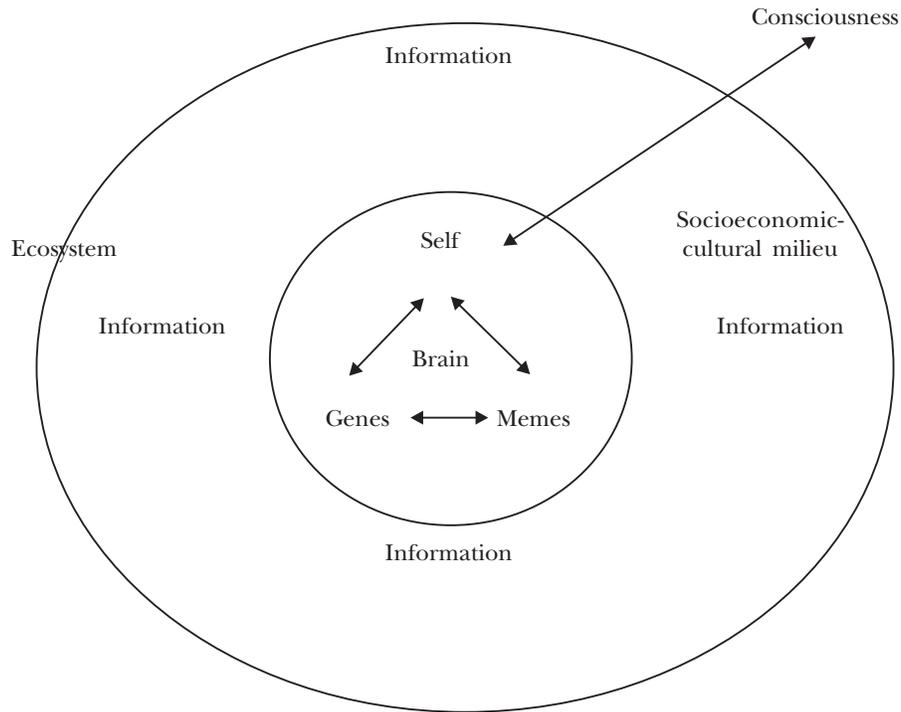


Fig. 21.2 The plane/nest of consciousness is independent of information. The socioeconomic-cultural milieu is within the domain of information. The ecosystem includes all depths of nature including consciousness.

interact at an interpersonal dimension. Development on the line of often-neglected relationship between 'self' and unconditional consciousness, brings in the fourth, i.e., the transpersonal perspective of individuality.

The Brain Is the Platform for a Coordinated Play

The organ brain is the playground for all of the above. The neural machinery in the brain is used as the expressive route of their complicated play. Openness of self, memes and genes to information, and openness of self to consciousness make the individuation an ongoing process.

The integral approach to the developmental process of individuation would take care of (a) five interacting components, (b) four aspects or facets of individuation, (c) four perspectives, (d) three partitioning traps and (e) the organ brain.

Integration in an informationally open system guarded with an adequate 'gating' mechanism is the key in the integral process of individuation. The brain makes the process integrated. If the brain integrates five interacting components and its four aspects on all four perspectives transcending three partitions, we behave in a completely sane way. We retain our insight, understand the role played by others and continue to participate in the game of the cosmos with concomitant evolution of the organ brain.

The state of integrity of the brain of an individual is reflected in its (a) perceptual bias, (b) intention and ideas behind its motivation, (c) cognitive skill in managing the strategy and the tact to market the formed intention and ideas, (d) ability to mobilize available resources or to create resources in favour and (e) dexterity to handle conflict. This is determined by how effectively one's conscious self can make the best use of one's genes and memes that are in continual exchange of information with the socio-cultural milieu, the ecosystem of nature and consciousness.

THE BOTTOM LINE IS THE GENE

Let me begin with what I have already published² in 1985.

Love is proposed to be cortical manifestation of supracortical consciousness. Love also has a genetic basis. One cannot love music or a flower unless one possesses genes for it.

... Most of the genes are 'inactive' unless they are turned on. Love does the miracle at molecular level. It 'turns on' the gene. In a sustained and insatiable love, the expression continues up to the brim. In other words, if genes are there, in a stimulating environment, love will automatically manifest.

An affair of love is an expression of the desire of the genes to bloom. In hatred, one wants to keep that particular set of gene 'buried'. The biochemical changes in love run parallel to the biochemical machinery of the gene expression.

When genes need to be vertically transmitted, love is 'selfish'. When no such motive is obvious, love is really lovely ... When one loves Tolstoy's philosophy or Karl Gauss' geometry, his genes find a faint identity with those of such historical figures. The dawn of phenotypic expression of those unmanifested genes is ushered. This is a kind of love, which is without any obvious selfishness. In a prolonged love affair, there happens a genetic re-assortment. In this re-assortment, unwanted ones are 'rejected', some are 'sublimated' and genes responsible for attraction are 'reinforced'. These three words are to be translated in the language of genetics.

... After successful warfare, when peace is established, the momentum for expression of the attracting genes in the next generation is high.

Here, we are reminded of the proposal of Ellen Terry to Bernard Shaw to have a child out of their wedlock, with her beauty and Shaw's genius. Shaw feared the opposite. Terry was partly right because she loved Shaw's genius. Shaw was only partly wrong because he never had felt love for her. Her love too had not stood the test of survival.

This insight was penned at a time when the tools of molecular biology had started getting commercialized (1980s) and the trend amongst common Indian scientists was towards molecular biology. This was also the time when Western scientists and thinkers, that included Nobel neuroscientists like Sir John C. Eccles and Roger Sperry, had already made a case in favour of initiating a scientific investigation of consciousness.

Twenty years following this publication, I don't feel like editing a single line or changing a word in any of the paragraphs in this integral amalgam. On the other hand, I wish to share it with the readers of this article and to design experiments for verification or falsification of the statements made there. For the first time in science, this insight offer

us a broad canvas amalgamating consciousness of love and sex, the precious faculty of individuation, with classical genetics and molecular biology, the unique achievements of our scientific endeavour.

In this scheme, as it is so obvious, the genes are mine. They belong to me. I cannot do without my genes. However, genes add constraint to my freedom. They limit my behavioural expression. Finally, I am merely not genes or gene products. I am much more. I am 'Self'. Genes belong to me, the 'Self'. The 'Self' is not the genes.

The genes, however, form the bottom line of an individual. An individual cannot do bodily what is not in his genes. Therefore, it is necessary to take stock of these bottom-line resources. The human genome, which is the result of evolution since the time when 'cosmology' got encapsulated into 'cell biology', is magnificent and has an interesting history.

Genetics and the Genes

Genetics deals with the science of heredity. The informational, functional, and structural unit of heredity is called the gene. Genes pass unchanged from parent to progeny.

Genes have several important properties.^{3,4}

A gene may exist in several alternate forms called alleles. Genes are linearly arranged in the chromosomes. Genes in the same chromosome could remain 'linked' in the course of inheritance. Genes on different chromosomes segregate independently. Genes on different chromosomes can cross over and recombine at random in the course of inheritance. Linked genes on a chromosome have a reduced chance of crossing over and recombination.

A gene could replicate to make its own copy. The replication is semi-conservative in the sense that the unit conserved from one generation to the next is one of the two strands making up the parental duplex.

A gene expresses itself through synthesis of proteins, of which some are informed proteins. In this way, genes are directly related to phenotypic behaviour.

Chemically, the gene is a sequence of DNA molecules of uninterrupted length. A long stretch of DNA may contain several genes.

Mutation is a physical change in the genes altering the DNA sequence. It may be spontaneous or induced. There are sites on the genes that are prone to more mutations than could be accounted for by random hits. These sites are called hot spots. Transformation of behaviour has a genetic basis involving the DNA.

Total Quota of Genes in the Resource Pool

Roughly we have 3×10^{12} cells in our body. Each cell has 23 pairs of chromosomes. The DNA obtained from 23 pairs of chromosomes of a single cell stretches to about two metres. For 3×10^{12} cells, the length of total DNA (6×10^{12} metres) covers a distance, which is the equivalent of travelling to the moon (384,000 km) from the earth and back 7,812 times.⁵

DNA length could also be expressed in terms of number of base pairs. There are about 3×10^9 base pairs in 23 pairs of chromosomes. Half of this DNA sequence consists of highly repetitive sequences that have no obvious function. That is, this half of the DNA does not make up any gene.

We can estimate tentatively the number of genes too. Average gene product consists of 300 amino acids. A triplet of nucleotide codes for one amino acid. Therefore an average gene has about 900 base pairs (say 1,000 approximately). For total 3×10^9 base pairs in a cell one should find 3×10^6 genes. Since half of the base pairs do not have any obvious function the number of genes should be 1.5×10^6 (1.5 million).

As only 1/30th of total genes *actually* code for protein one can find only 50,000 gene products. In other words, only 1.5 per cent of total DNA is coding DNA, 98.5 per cent is non-coding.

Chromosomes, Base Pairs, Genes and Disease Association

Recently, with the human genome project, the number of genes in each chromosome has been identified. We have 23 pairs of chromosomes that are constituted by roughly 3,020 million base pairs. A large number of genes have been detected in each pair of chromosomes. The total number of genes there is 34,300. The result is yet incomplete.

Our brain is a developmental product of roughly 3,195-odd genes, liver 2,091 genes, kidney 712 genes, heart 1,195 genes, thyroid gland 584 genes, testis 1,232 genes, and so on. We have a complete genetic atlas of our body organs. Therefore, comes the genetic behaviourist's doctrine, 'we are products of our genes'. 'We are what our genes are!' Some even go the extreme to declare, 'GOD is an abbreviation of Generator of DNA.'

On the other hand, in the discipline of Medicine, a large number of diseases have been found to be associated with several genes. Diseases are likely to affect the process of individuation. How and why it does so is out of the scope of this paper. The table⁶ in Appendix I shows the number of base pairs and number of genes in each of the 23 chromosomes and their disease association.

Genes, Behaviour and Beyond

Gilliam Conrad, Kandel and Jessell⁷ cite some examples of genes-behaviour relationship and how to make a study design with various available models. There are instances when behaviour could be traced even to the molecular level. Mutation in a dopamine receptor may influence the novelty-seeking behaviour of the individual whereas mutation in gene encoding a serotonergic receptor may intensify impulsive behaviour. The link between genetics, behaviour and environment is well illustrated in the case of Phenylketonuria where the effect (mental retardation) caused by deficiency of a genetically determined enzyme (phenyl alanine hydroxylase) could be circumvented by foods rich in phenyl alanine.

To explore the interrelationship of genes, environment and behaviour, there are usually three types of study designs. These are Family study (first degree, second degree and third degree, etc. according to number of meiosis in-between), Twin study (monozygotic or dizygotic, in shared or unshared environment) and Adoption study (where environment is totally changed). There are three kinds of models for exploration of gene-behaviour relationship. These are the Monogenic model (e.g., several genetic forms of Epilepsy), Oligogenic model (e.g., major psychotic illness) and Polygenic model (e.g., bipolar affective disorders).

In the scientific community, a common and frequently used statement is 'The DNA determines the species and the RNA determines the individual'. In my observation, there are four situations when geneticists themselves are seen to go beyond genetics. (a) Genetic metaphysics (e.g., if one tries to explore the idea that 'Love has a genetic basis. One cannot love a flower or music unless one has genes for it'). (b) Paragenetics

(cf. parapsychology), under which the paranormal genetic phenomena could be grouped. (c) Epigenetic mechanism or phenomena described as having emergent or superimposed property. (d) 'Open' genes where genes could accumulate information from outside.

The History of Genetics and Molecular Biology

It is said that individual personality is reflected in the discovery of the relationship one makes in a scientific theory. Since both personality and the discovered terrain are outward manifestations of the experiential world inside, discovery is, in fact, an inside-out phenomenon, making the subjective experience into an objective public reality. The history of genetics is no exception to this in its early phase.

Molecular biology as a discipline, however, has grown in a reverse direction. There is no theory that could claim to have directed its progress. On the other hand, it has grown from below upwards, from the experimental observations of a number of scientists, and still no comprehensive overarching theory has been found as a guiding force behind its growth. Probably it could best be described as a cascade of outside-in (in contrast to inside-out) phenomena that have transformed the nature of scientists by sheer wonderment and awe embedded in the very observations of facts. Scientists have united together for 'values' and ethics in its practice and persuasion. They have pronounced responsibility and accountability of the science they are doing.⁸

Molecular biology is a pretty newcomer as compared to the period of doing science by humanity. If the present science is only 400 years old, molecular biology has just crossed its 50s.

The Augustinian Monk in the Garden of Peas got the insight into why a child resembled his/her parents! Gregor Mendel (1822–84) cross-pollinated pea plants, *Pisum sativum*, over successive generations and from the results of his painstaking research postulated the presence of a 'factor' that could be responsible for the manifest qualities and that might constitute the discrete unit of heredity.⁹

While Mendel remained busy in the pea garden, the hard-core scientists got out their microscopes to locate those 'factors', the discrete unit of heredity, inside the cells. In 1910, Thomas Hunt Morgan at Columbia University, USA, located the place for these heritable units, now called genes, on the chromosome of the nucleus of the cells. His student, Alfred Sturtevant was able to map the 'genes' on the chromosome of the fruit fly in 1911. The era of classical genetics began.

It dominated the first half of the twentieth century. It was an era of the prestigious school of structuralists like W. H. Bragg (invention of x-ray crystallography), his son, Junior Bragg, and two pupils W. T. Astbury and J. D. Bernal (structural analysis of nucleic acid protein), Linus Pauling (alpha-helix) and John C. Kendrew (structure of haemoglobin and myoglobin). The informational school at that point of time was dominated by figures like Niels Bohr and Erwin Schrödinger. They were not satisfied merely with structural views and were looking for some new explanation of life.

It was Rosalind Franklin in 1952 who first captured the high quality image of a DNA molecule by x-ray diffraction technology. His colleague Maurice Wilkins showed this picture to James Watson, an American zoologist working with British biophysicist Francis Crick. The idea clicked and Watson and Crick published their breakthrough paper in *Nature* in 1953. With the discovery of double-helix structure of DNA the structural and informational views joined hands. Out of this conjugation was born molecular biology.¹⁰

Molecular biology is basically the result of fusion of classical genetics and biochemistry of informational molecules. Unlike standard biochemistry, where molecules like glucose, urea, bilirubin or cholesterol have nothing to do with information, molecular biology focused on the informational molecules, nucleic acids and their products, proteins and the molecules which make sense of information (for example, receptor molecules and the molecules involved in signal transduction). In molecular biology, the usual analytes are nucleic acids and their polymers, an informed protein or a receptor molecule. Unlike the classical genetics, which remained busy in finding out the explanation for the differences in phenotypes, molecular biology has focused on informational molecules, a particular pattern of their interaction, a common informational pattern that could govern all life forms. In this sense, the approach of molecular biology appears more holistic.

In the phase of classical genetics certain developmental milestones are worth mentioning.¹¹ In 1927, Müller proved that x-rays cause mutation and this damage is heritable. Frederick Griffith discovered the genetic basis of transformation in 1928. 'One gene—One enzyme' (later modified as One gene—One polypeptide, One gene—One product) was conceptualized by Beadle and Tatum following their experiment with the fungus *Neurospora crassa*. Laderbery and Tatum, in 1946, demonstrated bacterial sex and the mutual exchange of genetic material in this act. In 1950, Barbara McClintock published proof of mobile genetic units, *transposons*, in corn in support of her gene-jumping theory.

Molecular biology entered into the phase of extensive research and academics following the discovery of double-helix structure of DNA. J. H. Tijo and A. Levin, in 1956, settled once and for all that human cells have 46 chromosomes in their nuclei. Human cytogenetics began growing since then. In 1957, Francis Crick and George Gamov worked out the Central Dogma. DNA sequence specifies the amino acid sequence in a protein (sequence hypothesis) and the information flow is unidirectional from DNA to messenger RNA to protein. In the same year Kornberg discovered DNA polymerase enzyme.

Finally in 1966, Nierenberg, Mathaei and Ochoa cracked the genetic code. They demonstrated that there are tri-nucleotide codons for each of the 20 amino acids of our body and the codons are really redundant (*Principle of Redundancy*, see later) for the number of amino acid they have to deal with.

The years 1966–68 saw the discovery of restriction enzymes, which are normally present in bacteria for cleavage of the invading foreign DNA. These enzymes could be used as tools to cleave the DNA strand in vitro. In the same year reverse transcriptase enzymes were discovered by Baltimore and Temin independently. This discovery challenged the central dogma of informational flow and showed that information can flow, even within the cell from RNA to DNA.

Paul Berg created the first recombinant DNA molecule in 1972. These experiments opened the door of genetic engineering and the biotechnology industry. Biotechnology is an industry where 'life' in life-form is used as a technologist's tool to produce the desired chemicals. In 1973, plasmids were established to act as vector, a major breakthrough in genetic engineering. Frederick Sanger, in 1974, developed the DNA sequencing technique and Southern in 1975 described a new tool, the capillary transfer of restricted DNA fragments from a sizing gel to nitrocellulose membrane. This gave us an exact replica of DNA fragments in the gel on the nitrocellulose membrane. Insulin made out

of this recombinant technology was made available in the market from 1981. At present we have many other products produced by this recombinant technology. To cite a few example,¹² we may mention growth hormone, factor VIII (deficiency of which produces crippling intra-joint bleeding in male child), erythropoietin (used in advance renal damage), and interferon (used in many viral infections). Most efficient and harmless vaccines are recombinant vaccines (e.g., Hepatitis B Vaccine).

An important discovery of 1977 revealed the *Principle of Redundancy* in the language of genetics. It was shown by Chaw and Roberts and independently by Sharp. Genes are discontinuous structures in eukaryotic organisms. Genes are interspersed with long non-coding sequence, called *introns*, that do not code for proteins.

Another major breakthrough came with the discovery of the DNA-amplification technique by Kary B. Mullis in 1988 by polymerase chain reaction (PCR) that has widespread applications in diagnostic, forensic science and in therapeutics. An office without a photocopier has been said to be like a diagnostic laboratory without a PCR machine.

Linkage analysis began in 1989 and Collins found the genes for cystic fibrosis. Gene therapy was planned for various diseases.

Scientists then decided to 'find all the genes on every chromosome in the body and to determine their biochemical nature'. In 1990, a 15-year human genome project was formally started. Complete sequencing of the DNA making up human chromosome 22 was reported in 1999, and in 2000 the working draft of DNA sequence of entire human genome was ready.

We have now a DNA Bank (repository) where the genomic sequence of organisms are carefully preserved: Gen Bank which is a public database on human genomes that may be accessed by anyone through the internet, and Gene Bank with the facility of institutional preservation of a person's total DNA for a specified period, say 25 years. Interestingly, through the Gene Bank, scientists have been searching for Abraham Lincoln's genes to find out whether he had been a case of Marfan syndrome.

Another turn of events took place in the Roslin Institute in Edinburgh, where Wilmut and his team started a cloning experiment to produce a transgenic animal. Dolly, the lamb, was the result of this successful cloning experiment. The scientists made 277 attempts with only one success. It opened up the door of enormous possibilities including the possibility of human cloning.

Thus, we entered the twenty first century with the human genome project, genetic engineering technology, the biotechnology industry, and cloning of animals with the possibility of cloning of human beings too.

Genetic Engineering: A Door for Enormous Possibilities Fraught with Dangers. Restriction enzymes can break up DNA. DNA polymerase enzymes can make up DNA. Recombinase enzymes can help in recombination of DNA. All these led us to an era of genetic engineering. Cutting and pasting of genes could be made possible at selected and convenient sites. In this attempt it was found that the gene splicing process is accurate and most of the time precise. However, the process of inserting genes (*a*) is quite fortuitous and (*b*) can damage normal genes.

Gene therapy, recombination technology and gene cloning are three main branches of genetic engineering.

Gene therapy. The first gene therapy was done on 14 September 1990 on a four-year-old girl named Ashanti, for SCID/ADAase deficiency. Her lymphocytes were taken out. With the help of a virus vector normal genes were introduced and the lymphocytes were reintroduced in her blood.

In gene therapy, one picks up a 'sufferer', finds out the possible 'genes' responsible, confirms this and then replaces the cells of the organ/tissue by a genetically correct cell. The snag is the organ/tissue must be easily approachable; there must be a stem cell line to replace its working cells and there should be an essential stem cell regeneration microenvironment. The effect, so produced, unfortunately does not last permanently. Maybe a new cell in an old micro-milieu cannot cope very well, unless the cell is capable of changing the micro-milieu too. Gene therapy has been tried in diseases like cystic fibrosis, congenital immunodeficiency, as mentioned in SCID/ADAase deficiency, in some tumours like glioblastoma multiforme, malignant melanoma etc. The procedure has also been used for the purpose of inducing therapeutic angiogenesis in the coronary vessels. Partial success has been achieved by the honest efforts of a scientist to cure some diseases otherwise incurable.

Recombinant technology. Genetically engineered food products like corn, cereals and pulses are now produced by recombinant technology. Some of the genetically engineered agricultural products grow faster, rot slower and are resistant to pests. But unfortunately, seeds are sometimes sterile and sometimes their pollen is detrimental to the pest population (altering the ecological balance). There are reports that the pollen of genetically engineered maize could harm non-target organisms like the larvae of Monarch butterflies feeding on Milkweed leaves.¹³

The technology has been used in gene-pharming (not gene farming) where an animal is engineered so that its genetic make-up is changed to accommodate a foreign (human) gene that would be a continuous source of production of a desired protein for the pharmaceutical industry. Cattle, sheep, goats, pigs, etc., are used to get the desired protein secreted in their milk, urine or blood.

Transgenesis has been widely used in poultry and piggery industry mainly for commercial purposes. Now the attention is on the fish industry. The world's first transgenic *Rohu* has been reportedly produced from India (by T. J. Pandian). Environmentalists are worried about biological contamination of fish species.

Genetic engineering is used in the field of xenotransplantation to produce animal organs that could be transplanted into humans. Animals like pig are genetically engineered to produce human spare parts. Animal activists have reason to protest against the enormous animal suffering the procedure induces.

Gene cloning. Clones are defined as DNA molecules, cells, organisms or individuals derived from a single molecule, cell, organism or individual. Cloning is the production of identical copies of a molecule, cell, organism or individual.

Cloning in plants is easier than cloning in animals. On the animal side, cloning technology has two goals: (a) reproductive cloning and (b) therapeutic cloning. In reproductive cloning the whole animal is produced as a delayed twin. In therapeutic cloning, an embryo is cloned for development of organs, tissue, or stem cells to be used later for customized cure of disease. If an embryo is cloned from the cell of a person who

requires organ transplantation, there is the least chance of immune mediated rejection if the organ from this cloned embryo is transplanted to donor.

For cloning, one requires a female egg (ovum) from a surrogate mother and a female womb for the transplanted egg to grow. Both may not necessarily be from the same source. The female egg is enucleated and the desired somatic cell is fused with this enucleated ovum. The fused cell is then implanted in the female womb where it grows in the course of the full gestational period.

How does a product of cloned reproduction differ from that of normal reproduction? In normal reproduction, there is always recombination and crossing over of genes from reproductive haploid cells, sperm and ovum (probably influenced by the emotion and psychic status of parents—author's view). In cloned reproduction, a somatic diploid set of chromosomes is inserted into an anucleated ovum. There is no emotional mix-up, no crossing over, and no recombination of genes. The implications are yet to be found out. In natural reproduction, mitochondria (and mitochondrial DNA) come from the ovum. In a cloned animal, it is also added from the somatic cell. The implication of this is yet to be understood (e.g. early aging of the cloned animal etc.).

The failure rate of the procedure of cloning is very high. Most of the fused cells do not survive long enough for implantation. Some even could not be implanted. Those implanted are aborted early and a few may be born with gross congenital anomalies of vital organs. In mice, the success rate in getting offspring of the desired genetic make-up is 1–10 per cent. In 90–99 per cent of cases, the eggs either do not get implanted or are aborted early, or born with gross congenital defects. A rare one may be born as a phenotypically normal animal, like Dolly, the sheep. Wilmut and his colleagues failed 276 times before they found success in Dolly. In addition, Dolly's life was also not uneventful. She had to undergo euthanasia for her excruciating pain and unbearable disabilities.

Therefore, merely on the technical terrain there are several questions to be answered:

1. Even after exhausting repeat trials why is it so difficult to get a cloned animal with desirable genetic perfection?
2. Why is the failure rate of the cloning procedure so high? More than 100 nuclear transfers are usually required to produce one viable clone. How could we make the success rate 100 per cent? How could we increase our technological efficacy more than 100 times?
3. In cloning, the male organs could be dispensed with. The female egg and female uterus are indispensable. There is no artificial substitute for the female uterus and the period of gestation. For the sake of a successful experiment, how can we increase the survival of the implanted egg to 100 per cent so that the female reproductive apparatus is minimally misused?

Probably the only absolute justification for reproductive cloning of animal could be to save an endangered species from extinction or bring back an extinct species (e.g., Asiatic Cheetah in India). Unless, however, we simultaneously restore the habitat of that species, the cloned animals may not survive!

Human cloning. Identical twins are an example of nature's cloning. The question comes to mind whether the hundred sons and one daughter of Gāndhārī (Queen of Dhṛtarāṣṭra) in the epic Mahābhārata (about 400 BCE) were the result of reproductive cloning? Is it humanly

possible for a queen to give birth to hundred and one children? If not, how many ladies were called in to rent their uterus to give birth to so many babies? Had the cloning technique reached perfection in that period? How does one explain phenotypic differences in one hundred brothers?

At the dawn of the twenty-first century, when attempts of human cloning are in progress, the first question which comes to mind is: Have we done technically enough in animal cloning to venture into reproductive cloning of humans? The answer is certainly not in the affirmative!

Human genes are further difficult to manipulate and the manipulation of a fused cell (a-nucleated human ovum and gene quota from a somatic cell) inside the human womb is still more difficult. These are, however, merely technical barriers and are expected to be overcome.

In this experimental procedure the death rate of the embryo is so high and its adverse effect on the womb and general health of the mother may be so adverse and therefore cost-ineffective, that it raises a large number of moral questions. There exists a state barrier too. In the United States, no federal funds can be utilized for research on human embryos. The position of the Government of India maybe found in the website—<http://dbtindia.nic.in/policy/ethical.html> (see Appendix II also).

The brighter sides of human cloning are only a few. A woman can get a baby of her choice without heterosexual union with a male. This is also important for single parent. Infertile couples can try to have a baby if the mother's womb is anatomically and physiologically perfect. Parents may avoid some known genetic defect by having a baby in this way. One may want to clone from the cell of a dying child to have another one like him (triumph over death!). This kind of love may extend to the effort of recreating a clone of a lover!

Human cloning has personal, social, legal and religious implications. Is the cloned human being an individual or a photocopy? A cloned individual may be occupied with this thought! Is the relationship between the two of father and son or of delayed twins? What could be the social implications for their sexual and reproductive life? What could be the impact in inheritance of property? Would a cloned person be a legal heir? Does a cloned individual have a 'soul' of his own (brain-bound consciousness)? If yes, how is it different from a normally born individual? Could they also accomplish enlightenment like a conventional being should they trade in the spiritual domain?

Having achieved a desirable level of perfection in the technique, human embryo cloning may be pursued for therapeutic purposes, for customized cure by biological production of 'spare parts' under strict vigilance of ethics committees. Parkinson's and Alzheimer's disease, diabetes mellitus, muscular dystrophy and coronary artery disease are thrust areas for stem cell therapy. Besides, there are very very selective roles for organ cloning for auto transplantation purposes.

Hwang Woo Suk of Seoul National University, South Korea, has been reported to have cloned 30 human embryos in February 2004. To do so, he had to manipulate 242 ova donated by women! Several questions haunt the humanist's mind! Is human embryo killing justified solely for therapeutic purposes? Is collection and storage of human embryos not a kind of commodification? Are we not jeopardizing the potential of the embryo to grow as a complete human being?

From Here to Where?

Where are we heading? There seems to be no straightforward answer. Several questions block the gaze of mind. Why consciously would we give preference to some select genes, assuming those as superior or better than their colleagues? Second, genetic expression is so complex that genetic manipulation may not bring the desired result. In plants, genetic engineering is easier. When we intend to produce a pest-resistant corn, the corn pollen has been reported to have devastating effects on the species of butterflies¹² with serious ecological consequences. Third, the motivation of the industry of biotechnology differs from the motivation of science. The industry of biotechnology is motivated by profit and consumerism. The motivation behind science is the spirit of exploration of Nature. Fourth, the original genes and the manipulated genes often do not get along well; their relationship is short-lasting (example, short-lasting effect of gene therapy). Finally, look at the poor animals that are used in gene-pharming and for production of human spare-parts (organs) for xenotransplantation. It is a costly affair in terms of sacrifice of lives (high death rate of embryo and the baby born with congenital defect, physical weakness, disabilities and infertility).

It is often feared that this is the most dangerous tool human beings have ever discovered. Genetic manipulation (like any good-intended manipulation) may lead to a mistake which may enter a process of irreversibility, may be passed on to all future generations of the species and would be difficult to control. Genetic pollution may be perpetual and unlike chemical and nuclear contamination, cannot be treated after release.

From here, where? This is the question that bothers all futurists. If these tools get into the hands of a lunatic person who has lost insight and integrity in information processing and responsivity of the brain, we are doomed. What distinguishes a lunatic from a saint? Probably the informational pattern in the brain of a saint and his axiological integrity, which offers a sense of morality and adherence to values. What are values? Values are a set of rules mutually agreed between the concerned partners for conducting the game. This includes respect for other players too, respect for all live species on the earth. A lunatic is not bothered about others!¹⁴

This is where we have to look at our business transaction units of thought/idea/culture, the memes.

THE MEMES WITH WHICH WE TRANSACT BUSINESS

Our individuation is cast under a specific socioeconomic-cultural pressure. This socioeconomic-cultural pressure is determined by the 'opinions' prevalent in the specific geographic milieu.

Do we have any such 'unit' to describe our opinions, thoughts, ideas and cognitive functions? Do we have any means to bring those subjective, abstract aspects of the experiential world into a somehow measurable objective realm? Could we bring our thought transaction into any mathematical formulation? Richard Dawkins¹⁵ was looking for a descriptive name for this 'unit' of cultural transaction, and in 1976, he coined the term and concept known as 'memes'.

The new soup is the soup of human culture. We need a name for the new replicator, a noun which conveys the idea of a unit of cultural transmission, or a unit of

imitation. ‘Mimeme’ comes from a suitable Greek root, but I want a monosyllable that sounds a bit like ‘gene’. I hope my classicist friends will forgive me if I abbreviate mimeme to *meme*. If it is any consolation, it could alternatively be thought of as being related to ‘memory’, or to the French word *meme*. It should be pronounced to rhyme with ‘cream’.

Examples of memes are tunes, ideas, catch-phrases, clothes fashions, ways of making pots or building arches. Just as genes propagate themselves in the gene pool by leaping from body to body via sperm or eggs, so memes propagate themselves in the meme pool by leaping from brain to brain via a process which, in the broad sense, can be called imitation. If a scientist hears, or reads about, a good idea, he passes it on to his colleagues and students. He mentions it in his articles and his lectures. If the idea catches on, it can be said to propagate itself, spreading from brain to brain. As my colleague, N. K. Humphrey neatly summed up an earlier draft of this chapter, ... memes should be regarded as living structures, not just metaphorically but technically. When you plant a fertile meme in my mind you literally parasitize my brain, turning it into a vehicle for the meme’s propagation in just the way that a virus may parasitize the genetic mechanism of a host cell. And this isn’t just a way of talking—the meme for, say, ‘belief in life after death’ is actually realized physically, millions of times over, as a structure in the nervous systems of individual men the world over.

Definition of Meme

A meme is an idea, a cognitive and behavioural pattern, an element of indoctrination, the unit of culture, which spreads like a virus and replicates like a gene.

Dawkins’ Originality and Spread of Meme

However, this idea about ‘ideas’ is not original to Dawkins. Dawkins caused the idea to proliferate by making a compelling and clear case that appealed to the receptive intellect of humanity so that the scientist can have some understanding and therefore possible control over our cultural destiny. William James, in 1880, expounded on both the evolution and the infectious spread of ideas in *Great Men and Their Environment*. Another American philosopher and historian, Arthur O. Lovejoy (1873–1962) mentions the history of ideas in *The Great Chain of Being: A Study of the History of an Idea*. Austrian-British philosopher Karl Popper (1902–94) is well known for his analogy between scientific progress and natural selection. Besides, in India, since the time of *Upaniṣads* till Sri Aurobindo and Akhandamandaleswar Sri Sri Swami Swarupananda Paramahansa Dev, one sees the supremacy offered to the might and strength of different ideas influencing the expression of the heritage at the individual level and the expression of culture at the level of the society.

Following Dawkins’ introduction of the ‘meme’ that has invaded most of our brain, we are compelled to use the memes about the meme in our write-up. Thus, there develops *memetics*,¹⁶ the theoretical and empirical science that studies replication, spread and evolution of memes. There is Meme mathematics to model memetic replication, selection and extinction. Even a lexicon on memetics is available now (*The Memetic Lexicon*, a dictionary about memes, by Glenn Grant). A peer-reviewed online journal is accessible

on memetics, titled *Journal of Memetics—Evolutionary Models of Information Transmission*. Probably the medium through which ‘memes’ now replicate is the Internet itself.

Memes of Religion and Science

Both religious revelation and scientific discovery are evidence-based. However, due to retrogressive changes, various religions have reduced their valuable revelations to mere ‘memes’. How? It has been done mostly by making the arguments and logic self-referential or circular, by discouraging reasoning or any open enquiry, and instead asking people to go by only faith. Their memes, in some extreme cases, have further been reduced to a matter of physical competition!¹⁷

Parallel examples could be cited from the field of science too. When people with vested interests selectively suppress facts of scientific investigations, when they do not allow unique scientific ideas to flourish and allow consumerism and profit-mindedness to take over the scientific spirit, we can say the pursuit of science has been trapped for only meme transmission.

The Dangerous Trend in Selecting Certain Specific Memes

Parallel to the molecular biologists getting worried about genetic pollution, there is a spread of memes which convey the possibility of communication with after-life ‘souls’, and exploration of the possibility of its scientific validation. It is feared that if ever human beings gain access to the world of ‘souls’, the ‘soul’ pool in Nest III of Nature, and acquire the ability to tease, annoy, disturb, torture or manipulate them, it would be disastrous for the whole bio-ecosystem and is likely to bring ‘pollution’ into the soul pool.

EPIDEMIOLOGY OF GENES AND MEMES

While genes belong to both thinking and non-thinking organisms, memes are unique to thinking animals. Neither memes nor genes work in isolation. They work in a milieu teeming with other co-members. Genes work in concert with other genes. Memes work in concert with other memes. Genes and memes categorically are non-comparable entities. However, in this section, we see both of them as selfish replicators. There are many similarities in their behaviour. There are also differences in their properties. They also bear some special relationship worth mentioning.¹⁸

Similarities Between Memes and Genes

Both replicate and mutate. Both are opportunistic, selfish and compete with alternative forms. Both undergo a process of natural selection. Both have profound influence on the vehicle they share (the human body).

Like genes (also like computer virus and even crystals), memes replicate. When an idea is introduced in our brain, it is copied in our memory and is capable of being copied to another individual’s memory. This is replication. While staying within a special habitat (say the brain), the idea of lesser strength may get overpowered by the idea of greater strength. Memes have to overcome, seduce, and become friendly to pre-existing memes in the mind to establish their supremacy. In this sense, there is a struggle for establishing presupposed supremacy. If the idea is not nurtured, encouraged or not allowed to

flourish by the brain-environment of the individual's 'will' and 'intellect', the meme may undergo gradual extinction. Cultural pressure also may add to this extinction. Sometimes the idea is totally 'mutated' because of 'irradiation' from a strong 'self' or from another 'self' respected as teacher, guide and guru. Both genes and memes are opportunistic. They look for the opportune moment and opportune environment for their selfish end i.e., replication.

Differences in the Properties of Memes and Genes

There are differences in the replicating properties of the two. Their fidelity, fecundity and the longevity are different. The fidelity is better in gene replication than in meme replication. An idea photocopied, again photocopied from a photocopy, and so on, causes fading of the original idea. On the other hand, fecundity is very high in cases of memes. Within seconds or minutes, an idea can be transmitted to another individual or millions of people by mass media communication. Longevity of genes in general is perpetual. Longevity of memes depends on the situation in a seed-soil relationship.

Besides, genes mostly remain as a coherent group and replicate as a group with minor differences in the result. The meme usually replicates individually although may remain in a group (sister-ideas, daughter-ideas or friendly ideas).

The gene pool in this world, through the process of evolution and its natural selection has differentiated into a structured hierarchy of animal kingdoms, while the meme pool is still in its infancy being structured into a hierarchy of cultural kingdoms.

Genes are present in every individual cell and spread in sexual animals through heterosexual union. The spread is 'vertical' and takes a generation of time. The memes mostly 'parasitize' the organ brain, although their manifest behavioural pattern involves almost all organs of the body. They spread horizontally and at an opportune moment spread within seconds. Thus, genes can be transmitted from only parents (or parent, in case of asexual reproduction). Memes, in principle, can be transmitted between any two individuals (multiple parenting). Gene replication is restricted by the small number of offspring the parents can have, whereas the number of individuals that could be taken over by memes is practically limitless.

However, memes are too dependent on the context, much more than the genes, for their spread and replication. A constraint in the spread and transmission of memes is the barrier of language, the cognitive barrier between individuals.

Genetic inheritance is complex because of the 'crossing over' and 'recombination' phenomena. Memetic inheritance is also complex because of the sheer fastness with which it spreads and can change direction. The phenomena like crossover, recombination, and grouping of ideas and maybe many more similar or different phenomena could occur in cases of memetic transmission. When it happens it happens, very fast. Memes, therefore, can undergo much more variation than genes.

Selection pressure and mechanics are different in cases of transmission of genes and memes. Memes may be selected positively for their better communicability. Genes are selected positively for their better reproducibility. The selection process may be said to be more efficient in the case of memes. For elimination of one meme, it is not necessary that all carriers be physically eliminated. It may be sufficient for the other carriers to witness the trouble of an individual harbouring the specific meme (learning from another's mistake).

Both genes and memes spread rapidly in conditions or situations that push the evolutionary button, namely, situations that tickle our ego-based motivation for limbic pleasure or throw us into a life-and-death situation.

Co-evolution of Genes and Memes

There are situations where genes and memes work in symbiosis to co-evolve using each other for mutual benefit and to their specific advantage. The classical example may be cited from the spread of some specific religions through increase in the number of members of the community by unrestricted reproduction. ‘You can have five wives simultaneously to produce at least twenty-five children to fatten your community and spread your religion. The community will take care of your children. You need not to worry on your economic constraints.’ This type of doctrine¹⁹ seems mandatory, following clonal selection of some specific memes developed in the vehicle of specific genes.

Memes and Genes Working at Cross-purposes

There are situations where memes and genes are seen to oppose each other. I mean counter-genetic behaviour of memes. For example:

1. Someone decides to remain unmarried and not to produce children. This is certainly an evolutionary dead-end of his genes. He is motivated by his memes that he can spread far and wide by preaching his ‘doctrine’ horizontally far more than what he can achieve by transmitting his genes vertically. Memes and genes here are in opposition to each other. This opposition itself has created a class—the class of clerical celibacy.

The same opposition manifests to a lesser degree when a careerist individual decides not to have children or to have only one child.

2. Look at the suicide bomber or a self-immolator (martyrs) or kamikaze pilot who prefers the publicity of a specific indoctrination of personal death. One decides to kill oneself in full public glare. The reason is to spread the meme he is harbouring. This counter-genetic behaviour is an evolutionary dead-end for the genes. The genes certainly do not prefer to have extinction to achieve the meme’s end.

Epidemiological Evidence: Where Memes Are Seen to Overpower Genes

*Science Frontiers*²⁰ highlighted three areas where scientists profess to see memes overpowering genes:

1. Generations of female infanticide have led to more male births than female births.
2. In dairy-farming societies, 90 per cent of the population has the enzyme lactase that allows individuals to digest cows’ milk. In other societies, 80 per cent become ill when they drink cows’ milk.
3. A variety of cultural pressures have raised the percentage of left-handers in North America to 12 per cent compared with just 2 per cent a century ago. In Taiwan, where cultural pressures are quite different, only 1 per cent of the populace is left-handed.

Finally, it could be said that memes could be brought under control by manipulating preincounsciousness of the individual.

CONSCIOUSNESS IS THE MISSING LINK

While neural behaviourists had tried to explain the behaviour of an individual entirely by 'reflex' action and mental behaviourists had taken the pathway of explaining it by memetics, the genetic behaviourists choose it to explain it solely by gene functions. Everyone is partially right. Interestingly, the three put together also do not offer the entire explanation! What are the missing elements then?

While neural behaviorists have found God in the complexity of reflex functions and molecular biologists have found God in the genes and are supported by the philosophy of eliminative materialism, memetic theorists have equated God with memes.

... electrical current in a wire is not caused by moving electrons; it is moving electrons. Genes are not caused by chunks of base pairs in DNA; they are chunks of base pairs.

—Patricia Churchland

Consider the idea of God. We do not know how it arose in the meme pool. Probably, it originated many times by independent 'mutation'. In any case, it is very old indeed. How does it replicate itself? By the spoken and written word, aided by great music and great art. Why does it have such high survival value? Remember that 'survival value' here does not mean value for a gene in a gene pool, but value for a meme in a meme pool. The question really means: What is it about the idea of a god that gives it its stability and penetrance in the cultural environment? The survival value of the god meme in the meme pool results from its great psychological appeal. It provides a superficially plausible answer to deep and troubling questions about existence. It suggests that injustices in this world may be rectified in the next. The 'everlasting arms' hold out a cushion against our own inadequacies, which, like a doctor's placebo, is nonetheless effective for being imaginary. These are some of the reasons why the idea of God is copied so readily by successive generations of individual brains. God exists, if only in the form of a meme with high survival value, or infective power, in the environment by human culture.

—Richard Dawkins

In Indian philosophy, God is never considered an 'idea' which could flourish as idealistic monism. The material monism of Carvaka has been acknowledged in India but to a limited degree within a specified situation. For Indian seers and for the accomplished philosophers, God is the reality. If Consciousness is *Brāhmaṇa*, God is consciousness in its executive form. This consciousness has a mechanics and this mechanics probably could be connected with the mechanics prevalent in the quantum and classical worlds of matter.

Richard Dawkins, himself an accomplished philosopher, thinker and visionary, is also seen to come out with the following assertion.

We have the power to defy the selfish genes of our birth and, if necessary, the selfish memes of our indoctrination. We can even discuss ways of deliberately cultivating and nurturing pure, disinterested altruism—something that has no place in nature, something that has never existed before in the whole history of the world. We are built as gene machines and cultured as meme machines, but we

have the power to turn against our creators. We, alone on earth, can rebel against the tyranny of the selfish replicators.

In the above paragraph Dawkins came out brilliantly. He perhaps could have done better had he not accepted genes and memes as our creator. To him we are the creation of our genes and memes. Although he emphasizes the primacy of the 'self' over genes and memes, he misses the point that genes are in the body, memes are in the mind, but consciousness remains supreme.

Genes are in my body, memes are in my mind, but who am I? Without attending this profound question, without understanding the 'self' properly, his statements fail to contribute to the worldview/paradigm in the making. How can the self create the world merely with body and mind? Where is consciousness in this spectrum? What is the relation of the 'self' with consciousness?

Brain-Independent, Brain-Bound and Self-Consciousness

According to the worldview presented here, consciousness that is non-anthropomorphic, nondual and unconditional could also be confined or trapped within the bounds of the brain. The former may be called brain-independent consciousness and the latter, brain-bound consciousness. Self-consciousness, traditionally speaking, is the awareness of 'self'. It may remain confined to the brain, as brain-bound. It may also be independent of the brain.

The 'self' is often considered as an emergent element churned out of the intimate relationship between the brain and consciousness. Also the 'self' could be seen as the first successful attempt of consciousness to free itself from the confines of the brain, from the entanglement of neural network, from the bounds of field created by the neural conglomerate within the brain. John C. Eccles probably realized this from the results of his life-long experimental work and probably this made him and Karl Popper (1977) choose the title for their celebrated book, *The Self and its Brain*,²¹ as if the brain belongs to the 'self'.

Another view that merits further examination is that the 'self', as a brain-independent entity, could be an indivisible 'spark' of unconditional, nondual consciousness.

I am a wave in an Eternal ocean,
A drop I am in Infinite sea,
I am an 'atom' of an Immortal block,
A lasting spark of *Ananda* is Me.²²

According to this view the 'self' could be described as an indivisible but informed individualised unit of unconditional consciousness. It is (a) informed that it is a customized unit of unconditional consciousness, (b) informed that it is to behave this way or that way within the constraints of the given brain, (c) informed that although it can behave independent of the brain it is actually the bridge between brain-bound and brain-independent consciousness.

The 'self' therefore, could work with its three powerful information ammunitions. Accordingly, it could work in three modes: self in brain-bound mode (*sthula śarīra*, i.e., gross body), self as independent of brain mode (*sūkṣma śarīra*, i.e., subtle body) and self as an indivisible spark of unconditional consciousness (*kaṛaṇa śarīra*, i.e., causal body).

This self as an indivisible and informed spark of unconditional consciousness gets connected, bound, integrated and then becomes integral part of the brain through phenomenal experiences. The initial connection and binding phenomena are absolutely elementary in nature in the realm of phenomenology. The self is 'born' in the brain (experience of life). Their intimacy becomes so deep that the self feels keen to share its information content with neural infrastructures of the brain (experience of love). Through this mutual contribution, a conditioned existence is achieved, the experience of ego by which the self identifies itself with the nature of the brain. The self 'corrupted' with information also expresses its desire to perpetuate itself through the vehicles of 'memes' and genes (experience of sex). And, on some fateful day it has to depart the neural ground of its experience, the brain (experience of death). Through these elements of conscious experience, the self, therefore, develops its five private facets.

Consciousness in the Process of Individuation

Individuation is a continuous process scaled by constant interaction of consciousness, the self and its brain. The self initiates the process through experience of different phenomenal and non-phenomenal states. The organizing capacity of the experience and its use of neuro-informational infrastructure of the brain could create some more or less permanent levels of being consciousness. These levels are not rigid and show plasticity. This is done along cognitive, psychomotor and affective lines of brain development.

Levels of being-consciousness: We do not meet levels of consciousness in their abstract form. We meet human beings at different levels of consciousness. Within the bounds of the brain, there are six or seven levels of being-consciousness. Those levels could be objectively identified by the characteristic behaviour of the being (see the tenth section). There are three levels of consciousness in the lower realm: consciousness of the brainstem being, limbic being and cortical being. In the supracortical realm, there are three levels too, namely, consciousness of supracortical being, supracortical godhead and supracortical autonomy. This, according to the spiritual tradition of India, could be the level of consciousness of a *Brahmacārī*, a *Swamī* and a *Paramahansa* respectively. These levels may also be called the level of saint-, sage- and *siddha*-consciousness. It is also possible to find a level in-between the lower three and the higher three, the consciousness level of the cortico-supracortical being.

States of consciousness: Within the bounds of the brain, the experiential states of consciousness are as follows. There are three basic states, i.e., wakefulness, dream and dreamless sleep. There are altered states of consciousness, i.e., holotropic, psychedelic states etc. There are also states of experiencing elementary phenomena as mentioned above. Finally, there is the divine/transcendental/spiritual/'supramental' experiential state.

Developmental lines of consciousness: Development is a fall-out of the process of education in the experiential state. Education is defined so as to bring desirable changes in the behaviour of the learner in terms of knowledge, skill and attitude, therefore taking care of cognitive, psychomotor and affective aspects of brain function. Developmental lines in the process of individuation are therefore, three: cognitive, psychomotor and affective aspects of brain development.

The role of self: The self has free access to (a) various states of consciousness, (b) three developmental lines, (c) the ladder of being-consciousness and (d) five nests of Nature-Consciousness (*pañca koṣa* of the Whole, see seventh section), which is brain-independent.

The self also has the ability to identify with any of them and therefore create a specific self-identity, which has specific needs and propensities. An individual, with a specifically tuned self-consciousness, could, therefore, tap the inexhaustible source of brain-independent consciousness to manifest through his brain-bound consciousness.

The self could play with its genes and memes. It could successfully sort out the desirable genes from the gene pool and the desirable memes from the meme pool only when the individual is an accomplished adventurer in consciousness, when the small 'i' is in communion with the universal 'I'. That is to say when one has learnt the skill of connecting brain-bound consciousness and brain-independent consciousness through one's self-consciousness. The process by which one could do it is the process of meditation.

Meditation, therefore, could be defined as a technique where self-consciousness is used as a tool to unify brain-bound consciousness with brain-independent consciousness. What is yoga then? Yoga could be defined as an adventure in consciousness by consciousness (self) for consciousness.

Yoga and meditation are the ways to place the mind and its memes, the body and its genes in the correct perspective of the totality of consciousness. Understanding of evolution then takes a new turn.

Mind: What is mind then? In the worldview presented here, mind and consciousness are not synonymous. Mind is that which cuts consciousness into two. Mind originates with division (compartmentalization) of consciousness into two. In both materialistic and idealistic monism, there is no mind. Mind is sandwiched between the duality of consciousness. Mind acts as the organ of communication between two conscious systems. The human mind exists as a communication barrier, as a communication gate, as an organ of communication between brain-bound consciousness and brain-independent consciousness.

At every level of being, there is a mind. Using Sri Aurobindo's language, the mind of supracortical autonomy could be an example of 'super mind', that of supracortical godhead is of 'over mind', that of supracortical being is of 'illumined mind' and that of supracortico-cortical being is of 'intuitive mind'.

Evolution of 'pure disinterested altruism': Dawkins' 'pure disinterested altruism' does not exist in Nature. Evolutionwise, it would be a new phenomenon. In spiritual traditions, it is said to arise spontaneously at a very advanced stage, following conscious total surrender to the unconditional consciousness. It could be observed at the being level of supracortical autonomy. It could be systematically cultivated through conscious effort and practice.²³

Pure disinterested altruism, to many, seems to be largely a 'meme' in this stage. However, in the vast ocean of humanity it is not rare to spot people who have been cultivating this trait. They are unassuming people, far from the media glare. Quite often they seem lost in the mighty stream of assertive colleagues. A few may be found moving helplessly in the ocean like directionless travellers.

Anyway, they are there. They are here to stay. Their genes and memes are here to flourish. We fail to recognize them because of our cognitive blind spot and our preoccupation with selfish replicators.

Maybe, in the near future, these unassuming ‘new mammals’ of the future could overtake the ‘self-assuming’ and ‘self-asserting’ dinosaurs of present humanity. Certainly, we need a worldview to cultivate this evolutionarily rare breed and precious species emerging on this planet.

THE PROPOSED NEW WORLDVIEW—THE AKHAṆḌA WORLDVIEW

There are two broad groups of opinion-makers in this world, the mystics and the scientists. Scientific opinions are formed as the result of empirical knowledge obtained through scientific investigations of nature. Mystical opinions are crystallized out of direct revelations to the mystics while they are engaged in exploration of consciousness. They bring us intuitive knowledge.

Interestingly, very few opinion-makers of the above two categories could be called actually ‘accomplished’ even in their respective fields. When nature could be explored as ‘nests’ of different depths, and maybe as an indivisible extension of consciousness itself, people in the name of science have aired their conclusion worldwide (now through the World Wide Web) and ‘infected’ susceptible brains for hundred of years with only partial truth. The same is true in the case of unaccomplished mystics as well.

Accordingly, as in the story of the Blind Men and the Elephant, we are loaded with an incomplete, partly right partly wrong, grotesque picture of reality. This has been determining our value system. Values are accepted consensus rules of the game in the business transaction of the individuals with this world.

We need a worldview/paradigm where consciousness reigns supreme and mind, matter and body occupy their specific respective positions. We also need a worldview/paradigm where unconditional consciousness could manifest through nature its ‘pure disinterested altruism’, maybe at the supreme level of individuation. The *Akhaṇḍa* Worldview proposed in my earlier writings^{24, 25} could take the place of such a paradigm. In the *Akhaṇḍa* Worldview/Paradigm one handles integral divisions of the indivisible. Reality is indivisible but appears having divisions only because of the limitations imposed by the brain, mind or its expression in language. *Akhaṇḍa* is a Sanskrit word meaning indivisible. In this paradigm we have integral divisions like Consciousness–Mind–Body, Masculine–Feminine aspect of the Reality, Consciousness–Nature and Consciousness–Nature spectrum. Some of the salient features of this paradigm/worldview are described below.

Consciousness–Mind–Body Axis

Most Western thinkers and philosophers use the words ‘mind’ and ‘consciousness’ synonymously. We do not. For us, mind is the organ of communication between two conscious systems. When consciousness is one, there is no mind, there is no need of mind. As soon as there is a ‘sense’ of the two, mind comes into the picture. Mind, therefore, begins with dualism. Mind is an organ that develops between two conscious systems for their communication. A seven-strata model of mind is available in *Conquering the Brain*.²⁶

If we stretch the spectrum of consciousness–mind–matter then it would be seen that the ‘gap’ between consciousness and mind is filled up by mother nature and the ‘gap’

between matter and mind is filled up by the terrain of elementary phenomena like death (see below).

Masculine–Feminine Aspect of the Reality in the Akhaṇḍa Worldview

Consciousness and nature are the masculine and feminine components of reality. While the mystics explore the masculine (consciousness) component, the scientists are engaged with the feminine (nature). Mystics explore consciousness (*puruṣa*) and offer us intuitive wisdom. Scientists explore nature (*prakṛti*) and offer us empirical wisdom.

The strategic flaw here is as if nature and consciousness are two different entities standing back to back, facing the opposite direction and are independently infinite (*Sāṅkhya* philosophy). Therefore, the idea, opinion, doctrine that originates from this type of notion is unifacted. There is no scope for any process like evolution. It is good for analysis to a specific extent and is not useful for any synthesis.

Nondual consciousness has been regarded as the ultimate in consciousness study. In India, even nondualism has six sub-schools. All of them seem to have relevance in developing a science for Consciousness.

The nondualism of Śaṅkara (sixth century AD/?780–812/832 AD), called *Kevalādvaita*, accepts nondual consciousness as the only ultimate. The school completely disregards nature, the feminine component of reality and therefore any creative feat, as illusion (*māyā*). It is non-anthropomorphic and excludes possibility of any personal God. When we take the view that consciousness is absolutely impenetrable, attributeless, indeterminate, a-cosmic or, cannot be defined, we have been speaking from the *Kevalādvaita* position.

Consciousness cannot be defined. However, it can be qualified. It is immortal, eternal, infinite and biologically perceived as *Ānanda*. This kind of statement emanates from the *Viśiṣṭādvaita* (first propounded by Rāmānuja, AD 1017–1137) position. There is non-duality of the qualified whole. When we say it is biologically perceived as *Ānanda*, we are acknowledging the anthropomorphic tilt of this view.

Instead of brushing aside nature it is better to accept it as reality. Since consciousness is not illusory and it also possesses a nature, nature cannot be said to be illusory. The nature of consciousness is as pure, as untainted as consciousness. Nature is thus distinguishable but not different from consciousness. It is the kinetic facet, executive front of consciousness. This nature could also be personified. This is the position of *Śuddhādvaita* (first advocated by Vallabhācārya in the first half of sixteenth century).

There are occasions when consciousness duplicates itself. It creates a self-image in Nature to experience the tension of union (enjoyment) and separation (suffering) in the state of duality. Consciousness could reflect, crystallize and even ‘personify’ in Nature. This is a duality in unity, described as dualistic non-dualism. *Sadguru* (supracortical autonomy) and consciousness absolute are therefore identical (Guru, the master, is *Brāhman*; *Brāhman* is guru, the master). The view could be an example of the *Dvaita-Advaita* (first propounded by Śrī Nimbārka, AD 1162) position.

The distinction between nature and consciousness is not that important. It is rather irrelevant since consciousness is nature and nature is consciousness. Nature is naturally intoxicated with consciousness and consciousness is purposeless without nature. This is inconceivable oneness and difference, identity with difference, the *Acintabhedābheda* (Śrī Kṛṣṇa Caitanya 1486–1582) school of non-dualism. Let our nature get intoxicated similarly with consciousness and we will be in a position to experience both consciousness and

nature. When one's nature becomes pure nature one is consciousness. There is thus a process that is evolutionary that acknowledges the becoming of nature. *Acintabhedābheda* is relevant for those engaged in the consciousness-based study of nature. While nature-based studies of consciousness are mostly disappointing and even frustrating in science, consciousness-based studies of nature appear rewarding in the sense that it promises to reveal a few laws/principles of nature that could not be known by nature-based study of nature.

Advaita Śaivism originated in Kashmir,²⁷ propounded that nature and consciousness as indivisible 'Biune Reality'. The ultimate reality there is *Parama Śiva* (in the present context, consciousness) indivisible from *Śakti* (in the present context, nature) at every point of space and/or time or even at a no space no time domain. As the burning ability of fire cannot be studied separately or independently from the fire itself, similarly the mechanics of *Śakti* cannot be completely explored totally detached from consciousness. consciousness and nature, therefore, are interdependent both ontologically and epistemologically.

The philosophies of Sri Ramkrishna and Sri Aurobindo have made finer improvements on this Biune Reality. Sri Ramkrishna preferred to replace the phrase *Śakti* by *Mother* and Sri Aurobindo's philosophy elaborated on this Mother (see volume on Mother by Sri Aurobindo).

The *Akhaṇḍa Philosophy* (Akhandamandaleswar Sri Sri Swami Swarupananda Paramahansa Dev) deals with integral divisions of an indivisible Whole. It accepts *nature as an indivisible extension of consciousness*. The feminine component here is not *Śakti* (of Advaita Śaivism) but *Mother*. Unlike Advaita Śaivism, which focuses on the ultimate reality, the *Akhaṇḍa* philosophy zooms on the total reality. The view upholds the parental Biune concept of *Advaita Śaivism* down to the basic and rock bottom, the matter, where any and every feminine element is considered as 'Mother' and then goes on to describe three (Triune), five (Pentaune), or nine (Nanoune)²⁸ essential divisions of an indivisible whole. And thus it constructs the total (in contrast to the ultimate) reality.

The ultimate working reality is Biune. The total working reality is *Akhaṇḍa* (indivisible). The philosophy and the model born out of the Biune Reality is Real-Ideal while the philosophy and the model born out of the *Akhaṇḍa* reality is integral (see the concluding part of this article). While in the Biune Reality consciousness and nature are not independent ontologically and epistemologically, in the *Akhaṇḍa* reality, consciousness and nature are indissolubly wedded in respect of ontology, axiology, phenomenology and epistemology.

In the process of extending consciousness into matter, the *Akhaṇḍa* metaphysics conjugates the self-transparent unconditional non-anthropomorphic nondual consciousness with the evolutionary state regarding perfection of the human brain.

Unique Position of the Brain Is Its Characteristic

There is an assumption in nondual philosophy that the pathway from the dualistic base camp to non-dualism and from the anthropomorphic non-dualist post to non-anthropomorphic non-dualistic apex is a one-way. Once up, there is no way to come down. The *Akhaṇḍa* philosophy does not take such stand. There are many ways to go up and to come down, maybe with some common bottlenecks. In this sense, the *Akhaṇḍa*

state of the being indicates a much more mature and flexible state of the brain upholding its openness, plasticity and integrating capacity.

This has been made possible through evolutionary progress of the human brain. The brain stationed at, and functioning in the *Akhaṇḍa* state could be said to have tasted the experience of every individual position of the base camp and also of the apex and, in the process, has acquired the ability to be freed from any territorial imprisonment without losing the capacity to enjoy the richness of every territory in fitness of the proper context. This positioning of the brain is unique to the *Akhaṇḍa* worldview.

The Root of the Akhaṇḍa Is in the Multiversity

The *Akhaṇḍa* is the one in whom the *Akhaṇḍa* worldview is personified. For a scientist belonging to this worldview there is not just one but many universe(s). Our universe is one of the random out of infinite selections in a vast landscape of possibilities. The largest intellectually comprehensible system formed by multiple universe(s), could be named the multiversity and the ‘substance’ from which this originates is the essence of the multiversity. The vertical depth of the *Akhaṇḍa* metaphysics, therefore, extends into the essence of the system of multiple universe(s). The *Akhaṇḍa* paradigm is rooted in this essence of the multiversity. And our human tabernacle is like an inverted tree, with the brain bathing in this highest intellectually comprehensible plane.

In the cosmology of the *Akhaṇḍa* worldview, consciousness is the only constant in all equations of relationship. All other constants, man-made (e.g., Einstein’s constant, Planck’s constant etc.), or natural, are in flux in nature. This concept (one may call it assumption to start with) is useful in the exploration of both consciousness and nature particularly when one is engaged in the exploration of (a) the mechanics of consciousness, (b) the consciousness-nature relationship and (c) the deeper recesses of nature.

Consciousness–Nature Spectrum in the Akhaṇḍa Worldview

Nature is an indivisible extension of consciousness. However, for the sake of study we describe them in the form of five nests, the Pentaune model of nature–consciousness. A very similar description of the human body in terms of *Pañcakośā* could be found in the *Taittirīya Upaniṣad*.

The creative nature (*natura naturans*) that is indissolubly wedded with consciousness is mother nature. Mother nature is the executive front, mobile facet and kinetic pole of consciousness. The created nature (*natura naturata*) is the nature consisting of space, time, matter, energy that follows the laws of classical and quantum mechanics. In between *natura naturans* and *natura naturata* there is the nest of elemental phenomena like death, birth, conditioning and de-conditioning of the existence. The nests could be designated numerically from superficial towards deep, as Nest I (classical nest), Nest II (quantum nest), Nest III (nest of elementary phenomena), Nest IV (the nest of mother nature) and Nest V (the nest of unconditional consciousness).

It is possible that every nest of organization of nature has a working boundary. The nest/plane has its own specific mechanics of working, and this mechanics is run by a specific currency. Perpetuation of any event from one nest to another nest of nature requires an economically efficient currency conversion system.

In this scheme, the terrain of elementary phenomena (Nest III) and the domain of mother nature (Nest IV) appear as the ‘missing pieces’ of the whole puzzle. Those are

the terrain where one can look forward to, in the context of consciousness, understanding the actual Meaning and Purpose of events respectively. The ‘meaning’ and the ‘purpose’ at the level of philosophy boil down to information mechanics (location, content, context, propensity, trajectory, etc.) at the level of scientific formulation. As already stated, mother nature occupies the gulf between mind and consciousness and the same between mind and matter is occupied by the elementary phenomena. Also, quantum mechanics could be connected with the mechanics of consciousness through the mechanics in the elementary terrain and the mechanics of mother nature.

Subjectivity of Conscious Experience and Its Elements

Consciousness is impenetrable and conscious experience is always subjective. In the *Akhaṇḍa* worldview the ‘element’ of subjective experience is constituted by love, sex, ego, life and death. These five elements are also called elements of elementary phenomenology because none or nothing can bypass them, avoid them, or skip them. Everyone and everything has to go through them. These phenomenal elements of the ‘private’ self could be the elements in impenetrable subjectivity of consciousness of Thomas Nagel.^{29,30,31} They have a common origin. They bear an interwoven, often indistinguishable and superposed relationship.

Identification of the elements of subjective experience could be traced back, however, one by one, i.e., singularly, to each one of the five pioneers in psychology. Sigmund Freud stressed ‘sex’, its oral phase, anal phase and phallic phase. Alfred Adler emphasized the ‘feeling of inferiority’ (often misquoted as inferiority complex) as the propulsive force for an individual’s progress. He, therefore, stressed the element of ‘ego’. Abraham Maslow’s hierarchy of ‘needs’ and self-actualization brought the fulfilment of ‘life’ into focus. Carl Jung’s emphasis on the collective unconscious and then on synchronicity highlights the events commonly observed between objects or subjects in ‘love’. Finally, Sri Aurobindo’s passage through ‘death’ (documented in *Savitri*³²) conclusively proves that physical conquest of death is humanly possible, its phases could be systematically delineated and this conquest has a leading role to shape the ‘self’ of the system.

Spiritualists have conveyed to humanity that ‘love is life’, indeed it is heavenly, while the business transactions of the realistic earth go on with ‘ego’ and ‘sex’. The element that bridges the ‘heaven’ and ‘earth’ is death. Five elements of subjective experience, therefore, transcend cultural, religious and social constraints.

Subjectivity–Objectivity Relationship

Subjective–objective transformation warrants here an inside-out and outside-in phenomenon. It could be effected in human beings in three ways transcending respectively the barrier of mind, the wall of time and the opacity of death.

1. The barrier of mind is transcended by practice of *Samādhi*, the yogic trance. Through attention, concentration, meditation one may get into the various grades of *Samādhi*. When one comes out, one comes with creative emergence or a new creation depending on the depth in *Samādhi*.
2. The complete active conscious surrender to unconditionality helps in transcending the wall of time and an inside-out and outside-in phenomenon to occur.
3. By reducing the gap between brain-bound and brain-independent consciousness by means of self-consciousness one could transcend the opacity of death and bring transparency into the subjectivity-objectivity relationship.

To transcend means to make sense across an impassable barrier, most often by tunnelling. Quantum physicists do it by quantum mechanical tunnelling. A phenomenological mechanical tunnel is conceptualized to cross the terrain of elementary phenomena. The metaphor is a mental tunnel that brings out the in-depth relation between entities (e.g., two different concepts/percepts), which appear unrelated on the surface.

Transcending is not sufficient for bringing out something objective from the inside. It warrants an inversion, an inside-out phenomenon that could happen only following consummation with the Highest.

Importance of Poetic Expression of the Reality

The subjective experience is often expressed far better by a poet than by a scientist. It comes out by an inside-out phenomenon with an organic objectivity. German poet and scientist Goethe was of this view. Interestingly, Max Planck defined ‘Science’ as,

unresting endeavor and continually progressing development toward an aim which the poetic intuition may apprehend, but which the intellect can not fully grasp.

Intellect’s inability to grasp it fully makes this endeavour unresting and continually progressive.

In the context of gene expression we are reminded of the concluding remarks of James A. Shapiro³³ in the Molecular Biology Seminar organized by the New York Academy of Sciences. Shapiro thinks that DNA also should better be read as poetry:

The take home lessons from these and other instances of overlapping messages are that *we have to learn read DNA more as poetry* than as expository prose. Each line of the text can convey multiple meaning and they are all biologically important.

The place of uncertainty in the Akhaṇḍa worldview: The classical world is the space-time bound world and is amenable to the senses. Consciousness is a non-sensory experiential where everything and every event is certain. In between the two deterministic domains of certitude, exists sandwiched a long terrain of uncertainty (Figure 21.3). In between the ‘simple’ classical world and the ‘simpler’ consciousness there lies the terrain of stratified and extended complexities. This could perhaps be the strategy of nature to hide consciousness from the sensory world.

The *Akhaṇḍa* worldview puts emphasis on training in this uncertainty management. It should begin from early childhood. Planning uncertainty, overcoming uncertainty,

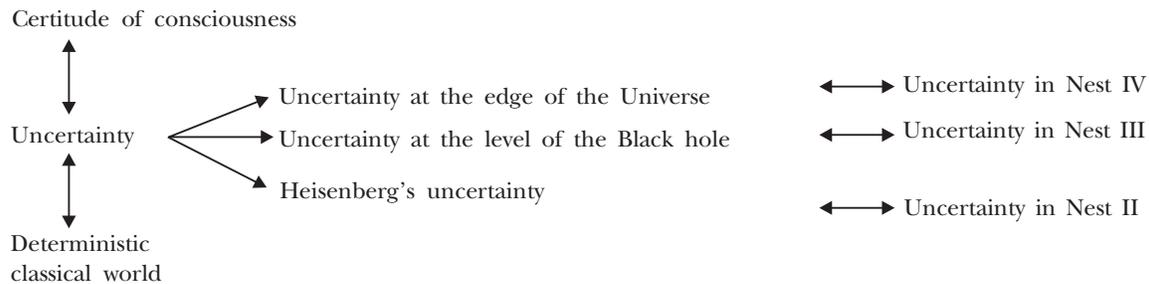


Fig. 21.3 The terrain of uncertainty

managing uncertainty and integrating uncertainty of various degrees and of different kinds are parts of the process of individuation. It seems essential to gain the ability to transcend the evolutionary crisis in life.

The nest of elementary phenomenology (Nest III) bridges (a) the nest of surface phenomenology of classical (Nest I) and quantum worlds (Nest II) and (b) the depth phenomenology of mother nature (Nest IV) and consciousness (Nest V). The currency of mechanics in Nest III is information. The *Akhanda* worldview proposes an informational hierarchy to understand the deeper nests of nature. We shall elaborate on this in the next section.

SCIENCING THE NEW WORLDVIEW: SETTING THE AGENDA FOR THE TWENTY-FIRST CENTURY SCIENCE

Self, Memes and Genes Have a Common Currency, the Information

The currency with which the 'self' does its business transactions is information. The same is true for genes and memes. In fact, information is the common currency for all three. As stated, self is informed consciousness. A meme could be altered by addition or deletion of information or by changing the quality of its contained information. Information uses genes as means to achieve its biological end.

The above statements are a particularization of the general statement: 'It from bit' (Archibald Wheeler). Any physical existence is inextricably linked with information. Even rocks, silicon, the electron, the photon, all register, store and process information.

In this section we shall discuss (a) the relationship between the idea and the brain, (b) information as link between consciousness and idea, (c) interrelationship of information and consciousness, (d) the interrelationship between gene and information, (e) information as a link between cosmology and cell biology, (f) the ontological gap in the quality of various information, (g) mechanics of information, (h) a proposal for a distinct hierarchy of information, and finally (i) the concept of live-information, information that is alive.

The Relationship Between the Idea (a Meme) and the Brain

Let me quote from *The Millennium Bridge*:³⁴

The determinants of the trends of function of human mind are supposed to be Plato's 'Ideas' and Jung's 'archetypes'. The origin of these archetypes or ideas in mind itself merits a lengthy discussion. The relationship between neurognosis and archetypes demands more elaborate research (referred to Charles D. Laughlin,³⁵ 1996). The human brain does not think with information. It thinks with the ideas. A 'form'/'pattern' when it gets rooted in experience becomes an idea.

Ideas have their roots in deep experience. Only a deeper experience can erase or replace an existing idea. The ideas which have their roots in the profundity of experience of plane of Mother (plane IV) can only create information. Information cannot create an idea outside the brain. Idea can be strengthened or weakened by appropriate input of information from inside or outside. When a 'form'/'pattern' gets rooted in experience (plane III) it can become an idea. A 'form' in deep interaction (surrender) with consciousness (plane IV) comes out as information.

When human mind opens up organizationally and an interaction begins between happenings in the plane III which are outside the brain and those in plane III of brain-specific consciousness, certain 'Form's, in concurrence with reasoning (cerebral cortex), feelings (limbic system) and instinct (central reticular core), may acquire apparent sustainability and may remain as an 'idea'/'archetype'. Sacred geometry (cf: Plato, 'God geometrizes'), mathematical formalism or a specific form of a divine deity spring from such experiences. The archetype/idea sets rules of transaction and therefore is seen to structure values. Some of those ideas may even acquire capacity for vertical (genetic/transplacental/both) transmission (cf: Jung's view on inheritance of archetypes) too.

In the complexity of its origin and functions of an 'idea', we must not forget that the mind, the communicating organ between two conscious systems, evolves too. During evolutionary journey of the mind there exists a state where mind can free itself from the influence of ideas/archetypes and can act independently of them. The human mind 'breaks down' during the transit of a brain from plane III to plane IV. Ideas and archetypes also suffer a similar fate. In the state of mindlessness of plane IV and plane V, the archetypes and the ideas appear conspicuous by their absence. Following a return from plane IV or V to plane III, there is formation of a new mind with new archetype/idea, which do incorporate imprints of consciousness-mother nature in it. It is only these archetypes which participate in the formation of *sustainable* society.

The Link Between Consciousness and Form/'Idea' Is Information

'Idea' is a stable kind of 'form' inside the brain. The inter-conversion of 'form' and 'information' is suggested to happen across the plane IV (nest of mother nature). 'Form' surrenders to plane (nest) IV consciousness and comes out as information in plane (nest) III. In plane (nest) III, information acts on a 'field'. The field gets energized and information becomes a 'form'. 'Idea' surrenders to plane (nest) IV consciousness and comes out as information in the brain (modified from *The Millennium Bridge*³⁶).

The words 'form' and 'information' come from the same etymological root. For every piece of information there is a 'form' but every 'form' cannot serve or behave as 'information'. In the scheme presented in Fig. 21.4, information acts on a 'field' to

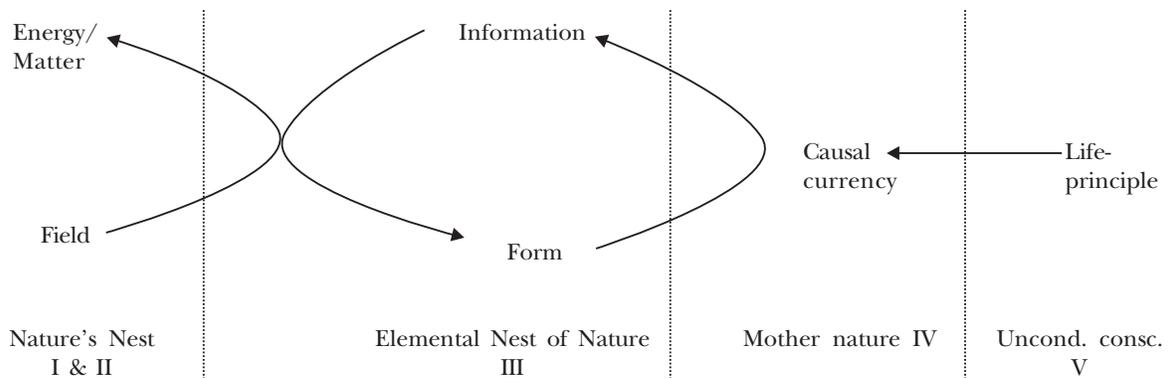


Fig. 21.4 Life-cause-information-form-energy/matter links

generate energy and is itself left as a 'form' only. By 'surrendering' its properties, a 'form' enters nest/plane IV of Nature, interacts with the 'causal currency' there and comes out with inside being out and outside in, as information. Inverted 'form' in plane IV is *information* in nest III.

In the context of the brain, the 'form' is equivalent to an 'idea' (Carl Jung's archetype). Ideas could be altered by appropriate information. A 'form'/'idea' interacting with Nest IV consciousness generates information in the brain. The brain, like any system, ordinarily works by staying informationally closed with its only outlet through sensory antennae. It still can generate new information from manipulation of its 'ideas' within its very depths of consciousness. The most intelligible approximate of 'causal currency' mentioned for nest IV would be information manifold.

Interrelationship of Information and Consciousness

This is the most difficult relationship to unravel. We do not know anything of it. Review of published literature (including the *Upanisads*) has not been found fruitful for me. Till we are able to understand this relationship, it would be difficult to connect correctly the mechanics of consciousness with the known mechanics in the materialistic nests/planes. Nevertheless, it is possible to make a few observations.

1. Consciousness, unconditional, is totally free and independent of information of any kind, of any category.
2. Information is generated from the 'nature' of consciousness, i.e., the nature of all natures, mother nature. However, how information is generated and, why and when it is generated is not known. As in the principle of *simila similibus*, while the function of information is to reduce uncertainty, information itself is generated out of uncertainty within the intimacy of consciousness—mother nature.
3. The degree of depth of consciousness in the system engaged in reading the information has a 'say' in the meaning of the information read.
4. A hierarchy of categories of information could be proposed according to the depth of mother nature's nest involved in it.

Mother nature's nest (nest IV) could be grossly divided into three sub planes of different depths. The deepest nest is in total union with consciousness (nest V). The central part is mother nature's self. The superficial aspect is in connection with the terrain of elementary phenomena (nest III).

Information generated from her superficial layers interact with the 'field' in nest III and itself gets converted into 'form' (non-living).

Information generated from her central part is casual information. This information carries the message of an inevitable 'yes'.

Information generated from her deepest part (in concurrence with consciousness) is information-alive.

In reverse, the information, as we understand it ordinarily, is sorted out/taken care of in superficial sub-plane of nest IV, casual information is sorted out/taken care of in the central sub-plane of nest IV and live-information is sorted out/taken care of in the deepest part of nest IV in concurrence with consciousness.

5. Information corrupts the unconditionality of consciousness. Consciousness gets differently conditioned by the input of information of different categories.

Relationship Between Genes and Information

Genes can neither generate information nor can they use information. It is information which uses genes as a means to achieve its biological end.

Two questions—1. Why do we say so? 2. How does information use the genes?

Why do we say so? It is based on circumstantial evidence.

That DNA carries all information is a recent pronouncement. The central dogma of genetics with unidirectional flow of information from DNA to RNA to protein was realized only following the ‘enclosure’ of ‘cosmology’ into ‘cell biology’ (see below). Cosmologically, information is much older than a molecule of DNA. Information chose to be centralized in the DNA molecule following this enclosure. Before this, information acted through the RNA molecule, the protein molecule. There are three occasions when the central dogma of molecular biology is not obeyed (dogma-busters). Those are:

- (a) Reverse Transcriptase enzyme (Baltimore and Temin)
DNA→RNA→Protein, becomes DNA↔RNA→Protein
- (b) Catalytic RNAs (example of nonprotein enzymes)
 - (i) Self-splicing property of certain introns (Thomas R. Cech)
 - (ii) Ribozyme, 23_s RNA (Harry Noller)
- (c) Proteinaceous infectious particle, prion (Stanley Prusiner).

This means, the process of ‘enclosure’ of DNA into a probiotic life form was to make information location-addressable, content-addressable and context-addressable. It was also to bring an order into the information flow, for the beginning of a long journey to go back to the origin.

The language of genes, like any language, works on the principle of redundancy. The sheer number of genes in a cell is a matter of wonderment. The sheer number of noncoding sequences interspersed between coding sequences of genes is another wonder. The redundant number of genetic codons for each amino acid is still another. As any language carries information so do the genes. They could be called vehicles of information.

Genes are observed to jump (Barbara McClintock). We do not know why. Or, even how. Transposable genes are mostly in the noncoding sequence of DNA. What do they do there? The gene jumping is probably the result of an effort before their expression, to juxtapose correctly to build up the context in conformity with the goal. As in a linguistic expression, a little change in relative position of various parts of speech could change the meaning altogether, so by the process of jumping, the mobile genetic elements (transposons), reshuffle, re-assort the genome to bring in conformity with the desired information to set the proper context, to conform to the grammar of the goal of expression.

There are also other reasons to think in this way. Genes do not contain all the information necessary and sufficient for the process of evolution. Genes are also not informationally closed. That genes exchange information from outside has also been reported.³⁷

The evidence come from the A-life (Artificial-life) laboratory that the process of evolution, although algorithmic, is not always a-teleological. Teleology, the future outcome explaining the present situation, comes into the picture particularly when the genes pass through Nest III of Nature, when the organism comes across ‘life and death’ situations,

the situations which trigger the evolutionary button for the organism. This necessitates genes to be informationally open in such circumstances. This could also be an explanation for 'Wallaceism' in evolution.

Further, the explanation for the genotype-phenotype divide may come in favour of this proposal. Genetics is a very complex subject. Cloned animals are not phenotypically alike. This 'adult twin' separated by space and time from its genetic brother, although genetically identical is 'tuned' to carry out and express information which is altogether different from his brother. The cloning experiments fail several times before one achieves a success. In the micro-milieu of the a-nucleated ovum of a surrogate mother, the engineered genes fail to carry out the informational flow that they were doing earlier. Information to manifest through genes, to fulfil its purpose requires genes to be in a space-time bound appropriate micro-milieu. Tuning space and time for a specific purpose requires active presence of consciousness. Therefore, it is unlikely that a chemical molecule like DNA could be solely responsible for its informational manifestation.

Final question. Is the DNA molecule a passive vehicle of the 'driver' information? Probably not! An intimate complex interactive relation cannot manifest with one member active and the other member remaining inert and passive. It warrants activeness from both sides. One may, temporarily, remain actively passive to conceive, for the sake of manifestation. The relationship of Information and DNA is deep, intimate and complex. It is where not merely the chemistry but the geometry of space and time is equally important. It leads us to the possibility of existence of a kind of information that could manoeuvre space and time to achieve its purpose, information that could be called 'alive'.

How does information use the genes? Not all information can use genes. It is only information that could be called alive that is capable of using genes as means for its manifestation.

Why cannot dead DNA carry information? The question is not a right question. DNA does not carry information. Information drives DNA. DNA is never dead. Place it in an environment where information can drive it, it will replicate or transcribe. There is a difference between a DNA-molecule and live-DNA. Live-DNA is within an informational milieu where it can be driven by information. A DNA molecule per se is devoid of that milieu.

We would build up the concept of live-information at the end of this section.

The Link Between Molecular Biology and Cosmology Is Information

Our starting point is not the Big Bang. There are many universe(s). The word 'universe' in the English dictionary does not have a plural form. I have used the word 'multiverse' as plural for universe in my earlier writings.^{38, 39} Multiple universe(s), the multiverse, form a system called The Multiversity. In the system of the Multiversity, the universe we inhabit is only one, an important one relevant to us.

At the beginning, at the time of random fluctuations, near infinite number of universe(s) were existing in potentia, in probability mode, out of which 10^{223} or more came into actualities. Those who believe in Anthropic principle add, out of these 10^{223} universe(s) at least one, i.e., ours, succeeded to acquire the essential requirements for emergence and sustenance of life.

The universe is supposed to have been born with a Big Bang about 14 billion years ago. Genes did not exist at the time of the birth of the universe we inhabit. From the

Big Bang to the genes, was a long long journey. Science has developed the precise chronology of events in the path namely the arrival of energy, matter, antimatter, formation of molecules, ... amino acids, then the protein world, RNA world, DNA world.

Then followed that momentous transition, the enclosure, encapsulation of cosmology into probiotic life. Before encapsulation, the information flow was not clearly defined. It was perhaps organizing a direction from protein to RNA to DNA. Following encapsulation, DNA became the centrestage of information. Information got centralized in DNA. And, we got the central dogma of molecular biology that information flows from DNA to RNA to protein.

DNA could be considered a stable and secure chemical information storage medium for long-term use in the scale of generations where the stored information could be read and interpreted by another chemical molecule like RNA.

However, it is still unknown what could be the actual process at the time of that momentous transition that is responsible for this 'enclosure', the 'localization' and 'encapsulation' of cosmology into cell biology. Is it a process of involution of 'information' or metamorphosis of the context that accompanies this transition? Before this enclosure proteins were seen to be possibly self-replicating (protein world). RNA had been self-replicating (RNA world)⁴⁰ and then DNA had been self-replicating (DNA world) with an axis extending from protein to RNA to DNA molecule. Following 'encapsulation', this very axis is reversed. Reversal of the axis of flow of information strangely accompanied this 'enclosure'. This 'enclosure' or 'encapsulation' led to centralization of information into the DNA molecule.

There are some informational molecules which did not get preference to get involved in this 'encapsulation' process and preferred to remain in the cosmos as such or maybe with some evolution got into some advanced form like DNA virus, Retrovirus or proteinaceous infectious agents, prions. Those are mostly recognized as disease-producing, integrity-breaking agents for the enclosed stuff.

Following 'enclosure' started a reverse journey to go back to the origin. In prokaryotes, the DNAs are in the cytosol. In eukaryotes the DNAs are further centralized in the nucleus. Ongoing information expression by an evolving genotype with selection pressures at various depths of nature had resulted in variation in the form of phenotypes. The process has run successfully from single cell to multicellular organisms and through the whole process of evolution, has reached this grand transition post at the phase of the human being in its present form.

The human being in its present form possesses a highly evolved brain that could be seen as composite nests of brainstem consciousness (brainstem being), limbic system consciousness (limbic being) and cortical consciousness (cortical being). In the brain-consciousness relationship, another interesting emergence is the emergence of self-consciousness, the awareness about one's 'self'. In the phylogenetic scale, self-consciousness is supposed to appear at the Stone Age, the phase of Australopithecus, when the human being picked up the stone to protect himself or herself from the beast. With growth of this self-consciousness and realization that his being was different from other animals in the surroundings, he started making tools out of pebbles. In the ontogenetic scale, a conscious baby is found to become self-conscious when around 6–12 months old. The ability to recognize one's own image in a mirror is a crude objective test to detect appearance of self-consciousness. Animals cannot do it. Our genetically

closest animal, the chimpanzee, can do it only with training. However there are exceptions on both sides. Self-consciousness has been described in some animals like monkeys and even in birds.⁴¹

Humanity stands at the threshold of a new formation when the brain-bound consciousness (brain-trapped consciousness, brain-encased consciousness) has 'sensed' the existence of brain-independent consciousness. This sensing probably does not happen through the conventional five senses. Nor it could be labelled as an extrasensory perception. It is a kind of non-sensory perception resulting from the communication of the nature of brain-bound consciousness with the nature of brain-independent consciousness through the neurons in the cerebral cortex. This communication may be local or nonlocal, and may use a qualitatively different type of information.

What could be the ultimate motive behind this reverse journey from probiotic life to the present threshold of a new formation? It is guessed that it might probably be to arrive at the present state of life of a human being with an objective to read the original information of the inter-universal plane in its proper context.

Let me quote from Steve Mizrach,⁴² Adjunct Lecturer in the Department of Sociology/Anthropology in Florida International University, USA.

If we define life, heretically, as a process for perfecting the universe's ability to accumulate and preserve information about itself, it may be the case that language represents the universe's best weapon against its own entropic heat death. The snag is if information accumulation is basically a net *transfer* of entropy outside the system, this will ultimately fail if the universe is a closed system. Unless, of course, the universe is simply the least probable of many co-existing parallel universes ... and its redundant grammar is the laws of physics themselves.

The snag does not bind us. Our starting point is not our universe. Our starting point is The Multiversity.

What Is Striking Is the Ontological Gap Between the Quality of Various Types of Information

In this whole picture, what has been missing is the life-sketch of information. Content-nonaddressable, context-nonaddressable and location-nonaddressable properties of information prior to the Big Bang, after the Big Bang, and what we observe in information stored in DNA show little similarity! We even do not know when 'information' appeared in the elaborate scheme of the Big Bang! In the post Big Bang scenario, one can accurately spot the origin/appearance of energy, matter, antimatter, unitary quantum macro system (QMS), molecules, amino acid, protein, RNA and DNA. But, alas there is nothing known about information! Was 'information' there all along from the beginning? Or, has the original information faced a process of involution in the course of its journey from the Big Bang to DNA molecule? The information at the time of the Big Bang and the information that DNA carries seem ontologically different! Or, is it that content of information has remained unchanged and only the context of the original information has undergone a severe metamorphosis in the course of this long journey from a location-non-addressable to location-addressable-situation?

In front of us is openly spread an objective history sheet of almost everything without the picture of this life-sketch of 'information'. Striking also is the ontological gap existing in the life-history of information. Starting from that Big Bang 'information', one has to

account for the ‘information’ stored in the DNA, expressed by DNA, and contrast it with the ‘information’ scientists are considering in the discipline of neuroinformatics.

Information Trajectory and Mechanics

Does information have a mechanics of its own? Seemingly yes. The behaviour of quantum particles as we observe it is largely determined by information therein. A number of quantum paradoxes could be explained should we consider the role of information in it. Although left independent to a large extent, quantum mechanics is eventually governed by information mechanics. Information trajectory and mechanics is determined by five factors, namely, location, content, context and propensity of information and also the system in which information has to work. Information can travel where there is no space, no time. It can travel breaking the barrier of space and time. It can travel through space and time. It can travel in the scaffolding of matter/energy. It can create new space and new time. This varying property could be one of the basis to categorize information. It is likely that there exists a law of conservation of life. It is also likely that the language of the law of conservation of life governs the language of the law of conservation of information that in turn governs the language of the laws of conservation of energy and mass (see Fig. 21.4).

A Distinct Hierarchy for Different Categories of Information

In this cosmic (universal) and supracosmic (inter-universal, transuniversal) drama, the connecting link is information. Our suggestion is that there exists an informational hierarchy with different ontological levels of information. The communication at the level of molecular biology and the communication at the level of ‘self’ are done through the use of qualitatively different kind of information.

The information which distinguishes ‘self’ from consciousness, the information with which ‘self’ transacts its business, the information which memes carry, and the information for which DNA molecules act as vehicles could not be ontologically identical. For tying up these phenomena the concept of existence of an ontological hierarchy of information would be most fruitful to explore (Figs. 21.5 and 21.6).

Informational Hierarchy

Information is unique in the sense that it appears bipolar. It has an objective pole that is measurable and a subjective pole which when introduced into the system, the system can make some sense or meaning out of it. In this sense, information occupies a unique position to bridge the domain of energy and field with the domain of mind and consciousness.

Information cannot be called monolithic. What is just a ‘signal’ in the classical world becomes that which reduces perception of uncertainty in the quantum world. In the terrain of elementary phenomena, information reduces various phenomenal uncertainties. In the domain of ‘intentionality’/‘purpose’ of consciousness, i.e., in the domain where mother nature determines the purpose, information acquires causal properties and may be called causal information (if one likes to retain the term information in nest IV of nature). An intelligible approximate of causal currency would be information manifold.

The possibility of measurement of different kinds of information also opens up another new frontier. It is the ‘bit’ in the classical nest and is based on Boolean logic of dealing

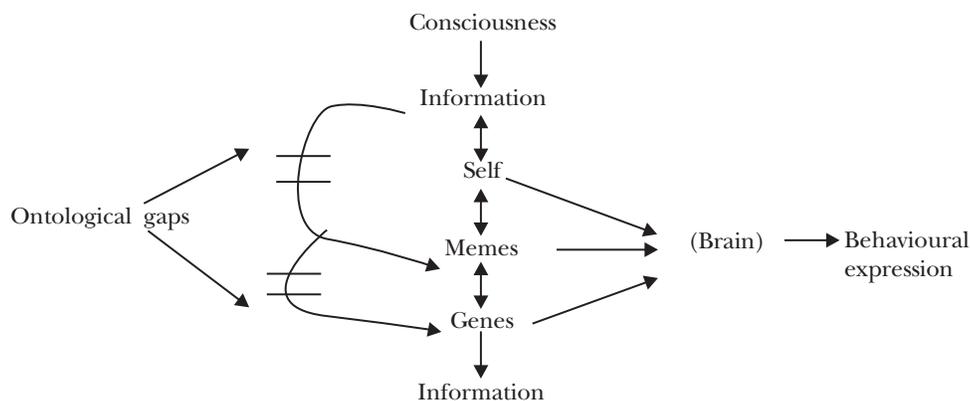


Fig. 21.5 Primacy of consciousness over genes, memes, self and information

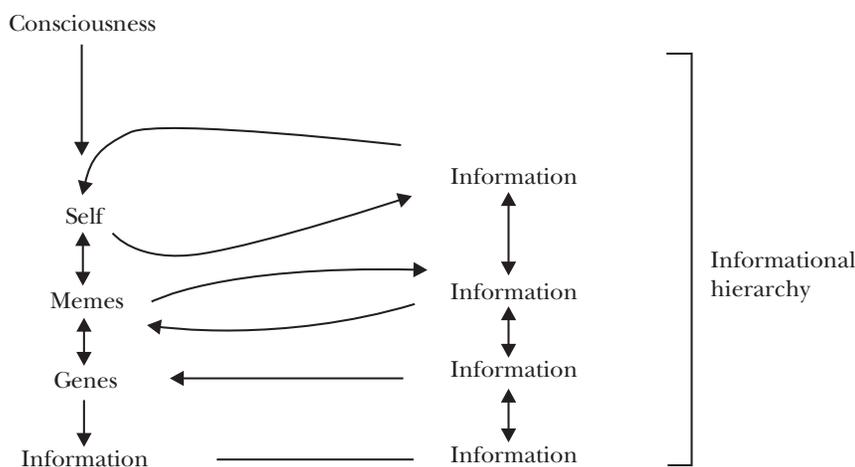


Fig. 21.6 Primacy of information over genes, memes and self ontological gaps in between different kinds of information.

with two alternatives, 'yes' and 'no' in an either-or way. It is measured as 'qbit' in quantum nest where the measurement shifts to non-Boolean logic capable of dealing with two alternatives 'yes' and 'no' that are in superposed state. What could be the logic of measuring a phenomenal bit or 'phenobit'? Is this not a new frontier for research for information technologists?

We all know the data–information–knowledge–wisdom hierarchy. The 'data' crystallizes into some kind of information. It is information that has acquired executive/causal properties. Information becomes 'knowledge' when it can be used without further deliberation on it. Wisdom is crystallized knowledge and is having information that bears the element of 'life'. Wisdom is also the crystallized experience of life. In addition, wisdom could change the real-life situation. There exists an ontological gap between human wisdom and the cosmic/supracosmic wisdom. This gap gradually diminishes as the brain-bound consciousness approaches the brain-independent consciousness. It is the

ability to process qualitatively different types of information that distinguishes something as matter or a computer, from something alive, or something conscious. It is the processing of ontologically different types of information in our brain that makes us a brainstem being, a limbic being, a cortical being or a supracortical being.

Information mechanics, information geometry, information manifold and information in neural manifold remain the frontiers of research for those engaged in neuroinformatics.

The Concept of a Category of Information That Is Alive

Looking at the fact that the protein synthesis pathway represents the life-line of a cell, people have gone into protein-omics (Proteomics). Probably we require harnessing of all knowledge about all proteins to learn about 'life'. However, scientists look upstream to conclude that it is DNA, which is 'life'. There are molecular biologists like Stephen J. Benkovic,⁴³ who are of the opinion that, 'there is a recognizable difference between DNA molecule and live-DNA'. Werner Arber⁴⁴ is of the opinion that 'virus alone is not life', 'RNA alone is not life' and 'life could be beyond the assembly of biomolecules'. Ilya Prigogine maintains that the wave package of energy, called conformon, which is responsible for maintaining the conformity of DNA is life. 'Conformon is life', says Prigogine.

Common to all stated views is 'information'. Could this information have the ability to transcend? To transcend means to make sense of an impassable barrier. Surely, not all information has such properties! However, there are types of information that could be transmitted by dissolving the barrier of space (nonlocal communication type I), and barriers of both space and time (nonlocal communication type II).

Could there be a category of information that might transcend the most difficult impassable opacity of death? Probably yes! Could there be information that is able to create its own space and own time for achieving its purpose? Manoeuvring space and time to achieve the purpose is probably not possible without active involvement of consciousness. Here we conceptualize a category of information that is alive! This could be the information involved in non-sensory perception and nonlocal communication type III.

Once we examine the proposed hierarchy of information in the context of nested hierarchy of Nature, live-information could be visualized at the interface between nest IV/V (see Fig. 21.4), originating from the deepest layer of mother nature's terrain in complete consonance with consciousness.

Live-information could be the missing link between 'self', 'memes' and genes. Probably, only live-information has the ability to alter the conditioning of 'self', transform the contents of a meme and initiate the expression of genes.

In cell biology, this live-information through the DNA molecule results in transcription of informational protein molecules that maintain life.

Live-information has been suggested⁴⁵ to be an extraordinary constellation in the scaffolding of the photon (or its equivalent of consciousness, Phot.-E-C), phonon (or its equivalent of consciousness, Phon.-E-C), conformon (or its equivalent of consciousness, Conf.-E-C) and neutrino (or its equivalent of consciousness, Neut.-E-C).

Nobel physicist Leon Cooper conceptualized the phonon, when he was struck by the fact that there exists an attraction between two electrons overcoming their mutual coulombic repulsion. Phonons offer resistance to electron conduction and here Cooper

got the insight for existence of superconductivity. Another Nobel laureate, Professor I. Prigogine and his colleagues (e.g. Sunchul Ji) have elaborated on the role of the phonon as a part and parcel of dissipative structure in the 'living state'. For completion of the model Prof. Prigogine revitalizes the concept of 'conformon' too. 'Conformon is Life', says Prigogine. 'Conformon', is a 'gnergy', an energy which retains evolutionary information (i.e., values for a given context and purpose). It is supposed to be responsible for conformity of a living structure. It retains the 'password' (in conformity with consciousness) whether there should be an actual breaking of symmetry or not, whether it should be followed by formation of a new symmetry or not. The activity of a neutrino in the presence and in absence of conformon are speculated to be different.

In this proposed scheme to describe the life-process, one observes an extraordinary harmony in the working of Einstein's photon, Cooper's phonon, Prigogine's conformon and Pauli's neutrino. In the paradigm proposed these four are the phenomenal hands of mother nature, an extension of consciousness.

To materialize something, consciousness requires the phonon. 'Life-electric' is impossible without the photon. Consciousness in the company of phonon and photon appears to have a narrow scope, a limited perspective and a not very durable sustainability. In addition, a system should have the capacity to deliberate on the possibility of expansion, extension, modification and openness. It is desired to have an option for creativity. Here it is the neutrino, which is assigned with the responsibility of breaking symmetry and opening up of new avenues. Neutrinos create a constant perturbation in photon-phonon structural association and often threaten sustainability. On the other hand for stability and sustainability, consciousness depends on its design-conformist, conformon. Conformon can and does restrict neutrinos but only to a limited degree. For conformon also it is almost impossible to restrict the effects of neutrinos completely.

So goes on the dynamics of the life process, the play of *prāṇa*.

Prāṇa is here, now, everywhere a representative of the dynamicity of the whole. In *prāṇa*, consciousness comes down as eternal 'now' through the phonon. Consciousness comes out as 'here' through the photon. Here it is! But what is it that we are having 'here' and 'now'? Conformon offers the hints. Consciousness comes down and tries to reveal the whole conformity through conformon. The 'whole' is 'here' and 'now'. This 'is' not static. It is all flux. The flux of the 'whole' is 'here' and 'now', leading to the intrinsic dynamicity of life force, which is contributed by another phenomenal hand of consciousness, the neutrino.

Life force has a 'moral backbone' that could be traced to the conformon sustaining conformity with the whole. Ever-openness of the life force to explore a new situation is credited to the neutrino breaking the monotony and adding 'humour' to an ever-changing situation. Once neutrino and conformon have struck their deal, the photon unveils its executive role. The photon working hand to hand with the phonon crystallizes the relevant structure and drives the process towards more complexity.

When the '*prāṇa*' inside the brain is in communion with the infinite '*prāṇa*' in supracortical domain, there comes the experience of *Ānanda*. The geometry of information and the correspondingly altered topology of the neuronal ensemble in the brain contribute towards the genesis of *Ānanda*. One could find here the elements of

‘vibratory’ phonon, ‘electric’ photon, all-pervasive ever-open neutrino and the composition-conformist conformon.

‘SCIENCING’ CONTINUED
INDIVIDUATION AND THE BRAIN

It is Ivan Pavlevich Pavlov (1849–1936) who abolished cognition and volition from behaviour and reduced the brain and so also the process of individuation merely into reflex. To him all innate behaviour is a reflex and all learned behaviour is conditioned reflex. For him tasting, smelling, eating are food reflexes. Response to fear is a defensive reflex. Submissiveness is a slavery reflex. Worship is a reflex related to religion. Suicide results from inhibition of the reflex of purpose. The unrest of a dog strapped on the experimental table is a freedom reflex.⁴⁶

B.F. Skinner and J.B. Watson perpetuated Pavlov’s approach for more than forty or fifty years. Sherrington, the celebrated neurophysiologist, although chose ‘reflex’ as his primary subject for study, did uphold the concept of integration and hierarchy in the neuraxis. However, it is a depressing note when Francis Crick, a scientist of DNA-fame since 1953, writes in his *Astonishing Hypothesis*⁴⁷ in 1994, ‘You’re nothing but a pack of neurons.’

Recently, Rodney Cotterill has highlighted the brighter aspect of this reflex concept: ‘The *raison d’être* of Consciousness is reflex modification and acquisition of new reflexes.’ Consciousness modifies acquired reflexes and creates new reflexes.

In the present worldview, the brain is the organ recognized as a playground for consciousness, self, memes, genes and information. Its neural machinery is used as the expressive route of the outcome of their play. This brain is the only organ of the body that has both horizontal (left and right cerebral hemispheres) and vertical (brainstem, limbic and neocortical mantle) evolutionary components. Since there is no bottom in the vertical depth of unfathomable nature, the evolution of the brain is far from complete. It is aided by the brain’s unique property of being a locally acting system that could communicate in a non-local way.⁴⁸ It continues to evolve with the ongoing process of individuation.

It works with its nine elementary traits in personal individuation.

Nine Elementary Traits of Personality: The individual is a composite make of his/her ‘nature’ and ‘character’. What are the differences between the two?²

When I ask you to look into a matter, I ask you not only to observe but also to see.

One observes outward character but one sees inner nature. Character is what is expressed, nature is what is within.⁴⁹

Biologically, natural traits are under greater genetic influence and do not alter easily without a supracortical touch. Character traits have less genetic influence and are influenced more by environmental modelling and training.

The elements of the nature of an individual are nothing but the private facets of ‘self’, the elements of subjectivity. The elements are love, sex, ego, life and death. Accordingly, the private facets of ‘self’ are ‘lovely’, ‘sexual’, ‘egoistic’, life-full (enlivening)

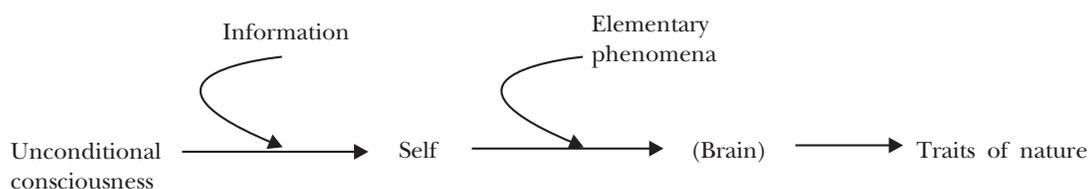


Fig. 21.7 Traits of nature

and deathly. The traits of the nature (Fig. 21.7) of an individual could be any of these five primary types or combination of these in varying degree. In the parlance of *puruṣa* (consciousness) and *prakṛtī* (nature), which is better understood in the supracortical realm, these elements are five kinds of interrelationship encountered between them. Love is that which connects *puruṣa* and *prakṛtī*. Ego is that by which *puruṣa* identifies with *prakṛtī*. Sex is the process of consummation of *prakṛtī* into the *puruṣa*. Life is the currency by which *puruṣa* and *prakṛtī* play their mechanics. Death is recoiling of *prakṛtī* into *puruṣa*.

The elements of character expressed by an individual are nothing but the four primary expressive routes of the inner feelings of the individual originated from non-sensory, extrasensory or sensory perceptions. Namely, the elementary traits (Fig. 21.8) are emotional, intellectual, mystical and executive.

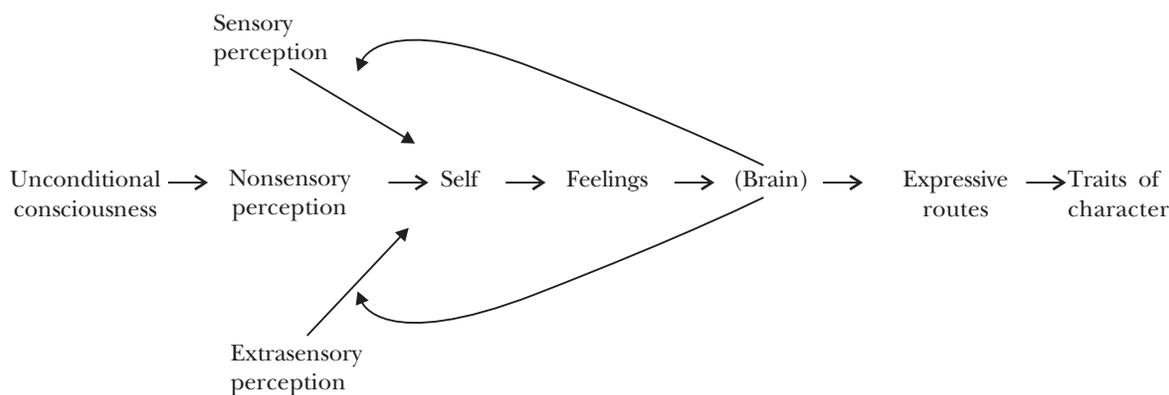


Fig. 21.8 Traits of character

Neurologically those are limbico-hypothalamic, limbico-cortical associative, limbico-cortico decisive (will) and limbico-cortico-strial respectively. In the parlance of yoga, where the nature thrives to merge with its origin, the consciousness, an emotional person becomes a *bhakti-yogin*, an intellectual becomes a *jñāna-yogin*, a mystic (who works by manoeuvring 'will') becomes a *rāja-yogin* and a worker becomes a *karma-yogin*.

Five elements of nature and four elementary characters are reflected in the individuality. However, how the private facets of 'self' and the expressive routes of the brain's feelings interact is yet another area to be worked out in science.

The Brain's Evolution Is Yet to Be Completed

At this point, we may make it clear that our present brain is an incompletely evolved organ. While the other organs of the body have nearly accomplished the evolutionary

goal, the brain is yet to achieve it. The purpose of evolution of the organ brain is stated to unify consciousness within and consciousness without. Having done this the brain becomes 'transmissive' for manifestation of mother nature.

To accomplish this goal, nature has made the brain informationally open through routes other than the narrow bandwidth of sensory antennae. This information may be qualitatively different from the information we are used to. In addition, the brain as an organ is unique in the sense that it can act locally and communicate nonlocally. In this sense the whole neuraxis could be considered an inverted tree with its roots in eternity and branches growing downwards as peripheral nerves. Ordinarily we are not aware of this. One becomes fully aware of it at the final phase of the conquest of death (see below).

The genes could be informationally open. The brain could be informationally open in addition to its five sensory antennae. The memes are also mutable by the action of appropriate information. Informational hierarchy, informational geometry, information in the neural manifold and higher dimensional topology of the brain in relation to information could all be explored in this playground of memes and genes.

To make sense of this play we are to understand the interrelationship between the brain and consciousness.

The Primacy of Consciousness over the Brain

According to the proposed worldview, the brain with its 10^{11} live neurons does not generate consciousness. It does not have the 'password' to 'use' consciousness either. It is consciousness that uses the brain to manifest bodily in the framework of great nests of being.

Two questions. 1. Why do we say so? 2. How does consciousness use the brain?

1. *Why do we say so?* It is due to certain circumstantial evidence.

The worldview sketched so far by scientists does not account for the 'barrier' of death or the process of transcending it. The way one looks at the world is radically different after one transcends 'death' physically. Physical conquest of death makes inside out and outside in. Most accomplished personalities cutting across the barrier of religion and culture are of the view that the brain is merely the vehicle of consciousness. The people who have encountered death in hospital bed or in a life-and-death situation and survived (e.g., refugees) largely share a similar view.

Most consciousness-researchers are neurocentric (they are even fond of using terms like neuroaesthetics, neuromusic). They work on brain-bound or brain-trapped consciousness. This 'embodied' consciousness could also be called brain-confined consciousness or brain-encased consciousness. It has internal contents like thoughts and feelings, and external contents that the five sensory apparatus provide. It also has a perceiver, the 'self'. A common English Dictionary consensus meaning of consciousness is awareness of surroundings, awareness of one's thoughts and feelings, and awareness of self. In addition, all conscious experiences are within the bounds of the brain.

It seems difficult for a consciousness researcher, who is basically neurocentric, to address the following questions. What when the brain was not there? What is it in brainless animals? What is it in plants? What is it in matter? They are uncomfortable with the problems of nature consciousness. According to Erik Kandel, 'Consciousness is evaluated clinically as the ability of the individual to respond appropriately to environmental

stimuli.⁵⁰ Appropriate responsiveness to an environmental stimulus is the hallmark of the presence of consciousness. Eigenresponse corresponding to eigenstimulus makes the basis of awareness test. It indicates the presence of a kind of intelligence in the responding system. Not just any response, but response with some kind of intelligence is the signature of consciousness. Should brain/consciousness mean an intelligent response to a stimulus, then does nature not have any 'brain'/intelligence?⁵¹

Consciousness that is inseparable from nature, consciousness that remains with nature as Biune Reality (nature consciousness), consciousness in brain-less animals, consciousness in unicellular organisms, and consciousness in plants is, obviously, brain-independent. This consciousness works quite independently of the existence of any brain or brain-like structure in the universe. It is the same consciousness in the deepest recess of nature, which was there even long before the neurons came into biological existence about 700 million years ago. It could remain as 'embodied' as plant-consciousness and consciousness in brain-less organisms. It could also exist as unconditional consciousness, as inseparable from the deepest recess of nature. This 'disembodied' consciousness in nature could be identified by the same fundamental criterion as for 'embodied' consciousness, i.e., by the responsiveness to an appropriate stimulus. This consciousness is suggested to be responsible for the phenomenology that has been going on in nature.

Interestingly, three qualities of brain-independent consciousness, namely, impenetrability, ability to unify and purposefulness, are retained in the brain-bound conscious experience as subjectivity, unity and intentionality respectively.

The language of the brain is manoeuvred by consciousness. Information processing and responsiveness of the brain works on the *Principle of Redundancy*. The sheer number of neurons in the brain (10^{11}), the number of synapses one neuron makes (approximately 1000) and finally the complexity of the connection network leave one too bewildered to understand the scope of the brain's language. This amazing networking seems unlikely for the production of consciousness. It all perhaps is to have infinite modes to behave as a vehicle of consciousness! It all perhaps is to make the expressive language of the brain rich and complex.

The brain of a brain-dead patient cannot use consciousness for its survival. Consciousness cannot use the brain for its manifestation either!

How does consciousness use the brain? In fact, it is through interaction of nature of consciousness with the nature of brain. The nature of consciousness in the present worldview is mother nature. The mechanics of consciousness–mother nature could be connected with the classical and quantum mechanics in the brain through mechanics of information. Ten possible ways have been suggested in my earlier writings.^{52, 53}

Brain–Consciousness Relationship

The relationship between consciousness and brain is a complex one, and it is often difficult to say whether they are one or two!

Who can say?
 What we are!
 One, or two?
 Near or far!

All you write
 Is futile guess!
 Simple love, please
 Don't make mess!⁵⁴

Their relationship is as simple as love. It is as complex as love. If we understand love (at the spiritual, psychic, genetic and gonadal levels) we may make a dent in the privacy of the conjugal relationship of brain and consciousness. On the other hand, when we understand the relationship between the brain and consciousness at the classical, quantum, elemental and mother nature's level we may aspire to learn what love is.

Why do neurons love consciousness? What could be the reason of this consciousness-philosophy of the neurons? Probably, the explanation resides in their polarity of membrane towards consciousness. Development of this one-pointed polarity could be considered as an evolutionary leap of neurons, as compared to other cells, towards consciousness. Neuronal membrane differentiates in a direction probably with the aim to make connections with the phenomenal hands of consciousness.

Why does consciousness love neurons? What could be the reason of this neuronophilia of consciousness? Biologically it might happen because of the 'serenity' of their genes. This serenity has been achieved gradually over the years in the course of cellular evolution, partially by relinquishing sexual promiscuity, the act of continuous multiplication and thereby gaining a kind of sexual serenity. One can find a graded hierarchy of this embodiment of consciousness in the neuronal structures as the ensemble of neurons evolves in the vertical direction. Neuronal genes sanctify themselves as a part of their preparation to become the beloved of consciousness.

Understanding the brain-consciousness relationship is also dependent on the personal transformation of the scientist. Our individuality, our brain, requires to be transformed radically to understand the depth of the relationship between the brain and consciousness.

Individual Transformation Has Roots in the Genes

In 1928, Frederick Griffith injected mice with a mixture of heat-killed virulent strain of streptococcus pneumoniae and live a-virulent streptococcus pneumoniae. The injection killed the mice and the virulent bacteria were recovered from the dead mice.

We have historical examples of a virulent person transforming into a saintly personality in contact with seers or saints. Āṅgurīmāl, a historical criminal, was known to chop off people's fingers. The chopped fingers were then threaded to form a garland that he used to wear. That gave him his name (*āṅguri* = finger, *māl*—*mālā*, garland). Lord Buddha transformed him to a saintly personality. The martial king Aśoka got transformed to a saintly nonviolent king Aśoka after meeting a Buddhist monk. Śrī Kṛṣṇa Caitanya of Bengal transformed Jagai and Madhai, the 'goon' and the drunkard brothers.⁵⁵

The point I wish to make is that transformation has a genetic basis. In the context of transformation of the human individual (it is usually used in the better sense), it could be said that genetic transformation occurs in nest IV, the nest of mother nature. 'Mother nature scrutinizes the genes.' 'Genes with untoward effects are censored.' 'The chosen genes germinate in her love.' 'The nature of *Sadguru* is human representative of mother nature.' 'When one's nature becomes mother nature one is Consciousness.'

Genetic Basis of Evolutionary Process

The scientific study^{56,57,58} of genome evolution by comparison of genomes of different organisms (e.g., prokaryote, eukaryote) and of different species of animals have revealed some striking features that are worth noting.

There is acquisition of new genes over the evolutionary process: Two landmarks are important. From less than 5,000 genes in prokaryotes, it went up to 10,000 genes in eukaryotes. The gene number jumped again to 30,000 in the course of evolution of provertebrate from invertebrate. The new genes are acquired by duplication of the whole genome, individual genes or a group of genes.

Genome could also evolve by rearrangement of existing genes: Rearrangement could occur either by domain duplication or by domain shuffling in the genes or by means of both.

Lateral or horizontal gene transfer has been noted in genome evolution: Acquisition of new genes breaking the species barrier is not so uncommon. We harbour retroviral genes, the transposable P-element, which might have entered us at a certain stage of evolution.

Contribution by changes in the number and transposition of noncoding DNA: Noncoding DNA that constitutes about 98.5 per cent of the total DNA length has been acquired over the course of evolution. Both 'introns early' (that introns are ancient and gradually being lost from eukaryotic cell) and 'introns late' (that they are recent and their numbers have been gradually increasing) theories exist and supportive evidence could be found in favour of both of them. Noncoding sequence consists of 'transposons', which could jump across the length of the gene sequence.

Evolution is also determined by gene expression pattern: In the last five million years, we the human beings have made a difference with chimpanzee genome only in 1.5 per cent of our nucleotide sequence.⁵⁹ In coding stretches it is even less than 1.5 per cent and for noncoding stretches the difference is not more than 3 per cent (Hacia⁶⁰). Then what makes us different from chimpanzees? It is suggested to be probably in the expression pattern of genes involved (a) in developmental process and (b) in establishing neural interconnections in the brain.

Ernst Haeckel (1834–1919) proposed the biogenetic law, 'ontogeny recapitulates phylogeny' (cf. history repeats itself). Phylogeny is evolutionary history. Ontogeny is the history of an individual's development. Therefore it would be wise to investigate all these genetic processes in initiating personal transformation. It is also true that phylogeny is not 'historically' repeated in ontogeny. There are occasions when history does not repeat itself. It takes a new course. Walter Garstang, in 1922, said, 'The first bird was hatched from a reptile's egg.' 'Ontogeny does not recapitulate phylogeny; rather it creates phylogeny.' However, the palaeontological evidence of the fossil of Archaeopteryx is said to be the missing link between reptile and bird. Therefore, we have to keep our mind open for some new turn of events too.

Let me share some views expressed in an important publication, *Molecular Strategies in Biological Evolution*,⁶¹ edited by Lynn Helena Caporale. Evolution is a process informed through experience of generation (Lynn Helena Caporale in the Preface of the book).

It is the result of interplay between genetic variations and phenotypic selection of a variant which would be heritable (Miroslav Radman et al., p. 148). The genetic variation, though, is produced basically by mutation and recombination (ibid.), DNA-acquisition by horizontal gene transfer remains another source of genetic diversity (Werner Arber, p. 38). In addition to certain sequences in the genome which are hypermutable and recombinational hotspots, the process can involve other parts of the genome too. Following mutation, there are translocation and transposition (Nina V. Fedoroff, pp. 251–64) that induce modularization of the concerned segment that helps in recombination. This recombination process is a way to sort out a few adaptive mutations from wide-ranging deleterious mutations. Recent experiments on evolutionary mechanisms at the molecular level amply indicate high mutation rates when the survival of bacteria is at stake (Miroslav Radman et al., p. 153).

Following production of a selectable and heritable variant, the key in evolutionary process is its selection. Although recombination helps to censor the deleterious mutations to some extent, there exist several unknown steps in the process.

Further, evolution is a process in which the genome is never a passive but an active participant (Lynn Helena Caporale, p. 14). There is a recognizable difference between DNA molecule and live-DNA (Lynn Helena Caporale, p. 1 and Stephen J. Benkovic, pp. 99, 156). Evolutionary strategies themselves evolve in a living situation, under the pressure of selection (Lynn Helena Caporale, p. 15). It is also well known now that *a genome can take up, from the outside, information that transforms its behaviour in a heritable way* (Lynn Helena Caporale, in introductory remarks to the book, p. xiv). Besides, evolution rarely operates on an isolated unit (cell, organism). There is genetic experimentation on populations or sub-populations by nature herself (James A. Shapiro, p. 98). Natural selection, though, can be exerted at different levels, sometimes affecting only a functional domain, or a single gene, often a group of collaborating genes or an entire cell or the organism as a whole, or the entire population, Nature in her free state is seen to work from a wide ecological point of view. Existence of evolutionary genes and gene products has also been conceptualized (Werner Arber, pp. 36, 42) in contrast to housekeeping genes that take care of replication and repair. It is also said that chance favours the prepared genome (Lynn H. Caporale, pp. 1–21).

The molecular biologists, however, are totally bewildered about what makes a particular selection beneficial and sustainable and some others chaotic and anomalous (e.g. disease-producing mutation and subsequent evolution). Here we are reminded of Barbara McClintock's intuitive expression that the genes respond to perturbation as an integral system. She also heartily acknowledges our ignorance on this matter stating that we do not know how to think about such a higher level of integration. In this context, description of integrons (Ruth M. Hall et al., pp. 68–80), a framework cassette of genes, may be the preliminary step for understanding the higher integration.

Finally, it is worth quoting James A. Shapiro (p. 97) to say, 'The take-home lessons from these and other instances of overlapping messages are that we have to learn read DNA more as poetry than as expository prose. Each line of the text can convey multiple meaning and they are all biologically important.'

What do all these statements lead to?

We are left with certain important facts, ideas and concepts that are relevant to the present paradigm. Take, for example, the desperate attempt to increase the number of

genetic variants when survival of the organism is at stake (Miroslav Radman et al.), the capacity of genome to take up information from outside (Lynn Helena Caporale), higher level integration in DNA (Barbara McClintock), the difference between the DNA molecule and the live-DNA, that chance favours the prepared genome (Lynn Helena Caporale), evolutionary genes (Werner Arber), behaviour of DNA as poetry (James A. Shapiro), and finally the question, what decides an evolution to be beneficial or anomaly-producing, i.e., what decides the purpose of evolution?

To go further, evolution is a continuous process till a plateau is reached. From one plateau to the formative state of the next plateau, the first step is a discontinuity. Elementary phenomena come into the picture following this. Radman's paper says that there is a high mutation rate when the survival of bacteria is at stake. Survival comes into stake when the organism enters nest III mechanics. In similar conditions how translocation, transposition and recombination are affected requires careful observation. Further, exchange of information from outside is a hallmark of the organism being trapped in nest III mechanics. Further, only the prepared genome can avail of a chance. Only an integrated genome is capable of crossing this void.

There is a genetic basis of love, and there is a genetic basis of evolution. Unless one possesses evolutionary genes, evolution is unthinkable. The difference between DNA molecule and live-DNA can be sought in the concept of the conformon. The conformon and photon, phonon and neutrino are four phenomenal hands of Mother Nature. The vision of Shapiro, that DNA should be read as poetry and every line of poetry has multiple meanings which are biologically important, takes us back to the concept of inside-out and outside-in phenomena. A poetic expression is marked by an organic objectivity. Without involvement of nest IV mechanics, how can there be good poetry? Particularly the poetry of life, the poetry of DNA! We designate the nest IV as the nest of Mother Nature. So-called natural selection in evolution must be occurring along the entire spectrum of nature, natural selection cannot be explained in its entirety keeping Mother Nature's nest totally outside the realms of present science. The proposed worldview categorically states that the mechanics of Mother Nature seems essential for censoring different variants and for final selection of a sustainable phenotype.

Transformation Is Likely to Happen in the Course of Transcending Death

In between the terrain of light (including light what Einstein worked on) we are familiar with and the terrain of light the spiritualists try to convince us about, is the opacity and darkness of death.

Cortex and supracortex are
Distanced by Death.
Cortex is supracortex, when
Cortex collapses the Death!

In the present scientific culture, death stands as the grand finale, the dead end of the show, the terminus of the journey. Philosophically, death is the ultimate 'gulf' that cannot be bridged by any leap of argument, linked by any stretch of theorization, connected by any advancement of inference or filled up by any stride of affirmation.

However, the organism's going through the phenomenon of death is essential to 'transform' genes (and memes in the case of 'thinking' animals). In fact, the 'self'

regains its supremacy over memes and genes journeying across the terrain of death. Both the information content of 'self' (responsible for meaning) and the dynamic propensity of its contained information (responsible for purpose) change radically during passage of the brain through death 'voids' and 'tunnels'. This radically changed 'self' is responsible for the transformation of the subsystems of memes and genes. The self's openness to information may be information of a different category, in the course of passage through death which initiates the process of speciation. Nonlocal communications of various types have important roles to play here. However, that macroevolution is accomplished by journeying through the passage of death is yet to be acknowledged in science.⁶²

Like consciousness, the death phenomenon has been centralized in our brain. In the proposed paradigm it is also assumed that the brain is in the process of learning how to tackle and integrate this 'death' in life. The phenomenon of transcending death has been dealt with in detail by me elsewhere.⁶³

Standing firmly on my personal experience with the backdrop of my acquired knowledge in medicine, I could give a shape to the idea of the possibility of physical conquest of death. I have sincerely tried to express the experiential outcome in a third person's perspective. Of course, it is combined with my creative imagination. No doubt, for validation it requires further investigation. The brain's combating will to conquer the death phenomenon could be summarized as follows.

In response to a jolting stress of uncertainty, the process begins with (a) severe emotional and autonomic shake-up culminating in hypothalamic 'spill-over' phenomenon (this hypothalamic spill-over has been mentioned in the context of spiritual experience by Newberg and d'Aquili,⁶⁴ and is also reported to happen in deep sexual ecstasy). If continued, (b) this is followed by integrated hemispheric transversion followed by interhemispheric 'spill-over'.

Hemispheric spillover takes a supracortical route and requires stabilization by the supracortical force for further progress. If the brain survives these two spills, there follows (c) a vertical shake-up of the brain for an axiological reorientation or rather redefinition of the hierarchy. Vertical bootstrapping of the brain from the supracortical domain effects it. A successful third phase is followed by (d) supreme consummation meaning fertilization of brain-bound consciousness with brain-independent consciousness. What follows is an (e) integrated functional inversion of neuraxis while the brain starts working 'upside down' in harmony with brain-independent consciousness. Supreme consummation initiates a change in the hierarchy of governance in the brain.

While the phase (a) may be the brain-correlates of near-death experience, phase (b) may be that of transcendental death experience and phase (c) of *transformational death experience*. The fourth phase (d) offers a feeling of getting reborn in the same body; then the Being evolves as a co-creator of the universe.

It seems possible by further research to connect four phases of death with four distinct neurological phenomena, three levels of stress of uncertainty and three types of nonlocal communication and finally the levels of Being in evolution, including speciation.

CONSCIOUSNESS AND ITS NATURE—THE BEING AND ITS BRAIN

In the brain, the resident is the being. Having transcended the death phenomenon, it is easier to get into the complete ontology of being. It is possible to place this great nest of being in the perspective of neurology and behavioural science.

Consciousness alone cannot make a being. Nature, in singularity, cannot make a being either. The being is a composite reality of consciousness and nature. It is, therefore, a biune reality. According to the nests of different depths of nature and consciousness, there exists a great nest of being.^{65,66,67}

We may approach this great nest from above downwards (from within outwards) or from below upwards (from outside inwards). When our audience is the scientists and philosophers, it would be better to approach the nest from below upwards.

In the present humanity, one can easily distinguish three rungs of the ladder of the being—the brainstem being, the limbic being and the cortical being. This is in consonance with P. D. MacLean's triune model of the human brain. According to MacLean, the human brain is a composite nest of reptilian brain, mammalian brain and human brain.⁶⁸

The Brainstem Being

Brainstem nuclei evolutionarily are 280 million years old. The being consciousness, although present in crude form in the predators and the prey, is manifested in a refined way in the human being. Behaviour-wise the person could be characterized as follows. He is awake, alert and oriented, oriented to space and time of classical nest of nature. A royal guard personifies this kind of being.

The Limbic Being

The palaeo-mammalian brain is approximately 165 million years old. The being consciousness, although present in lower animals, is manifestly improved in the human being. In addition to the features of brainstem being, what one observes in this being is the overwhelming motivation-guided-consciousness to seek pleasure and avoid the unpleasant. Sensual pleasure of the best available quality remains the aim for his accomplishment. The basic biological motivation is 'sex' and Sigmund Freud was probably speaking for this sort of being, stretching sexuality too far to encompass the entire spectrum of human psyche. Beside sexuality, there are many other motivations that appear in different disguise but whose ultimate aim seems to be sensual pleasure.

The Cortical Being

The neocortex, evolutionarily, is approximately 50 million years old. The being consciousness is a human characteristic. The cortical being is characterized by his ability to rein in the limbic horse. He is expert in discrimination, judgement and therefore could modify his motivation, intention and will accordingly. He is the rational being.

He has the ability for both differential and integral functions. High-level intellectuals and scholars could be said to belong to this category of beings.

The 'values', the rules of a given game in a specific nest of nature within a defined set of coordinates, actually start getting crystallized by the differential and integral functions of the being at the cortical level.

Thought Block and Tunnelling

Most of us think that the cortical being is the final accomplishment of the evolutionary process and the process of individuation. This is based on the assumptions that the cerebral cortex represents the last brush of nature and there is no informational openness

of the brain except through five sensory antennae. These assumptions lead to the conclusion that nothing could happen or could be achieved beyond the present state of the brain.

The experience of brain-independent consciousness by a brain-bound consciousness of the cortical being poses a serious challenge for the assumptions mentioned above. This experience compels us to think that the cerebral cortex is actually open informationally into the supracortical domain. The experience induces the cortical being to tunnel through an 'impassable barrier' of death to make sense of this experience.

The questions that start bothering the reason and intellect of the cortical being are as follows. Is this openness of cortex to supracortical domain merely an informational openness? Could it be an eternal openness of the neuraxis to live-information from the infinite pool of 'life' in nature? Could the spontaneity observed in the pacemaker neurons of the cardiac centre, vasomotor centre, apneustic-pneumotoxic centres in the medulla oblongata be an effect, a result of transmission of live-information from the supracortical domain through the cerebral cortex to the brainstem? If so, what could be the neural pathway to carry this signal? Would conscious evolution be of further help in delineation of this cortico-brainstem-pathway along with the evolution of the being?

The Evolution of Being in Supracortical Direction: The Means and the Ways

Realization of the existence of brain-independent consciousness by brain-bound consciousness of a cortical being ushers the dawn of an evolution of the being in the supracortical direction.

Supracortical consciousness is not synonymous with the absolute consciousness of Hegel or nondual attributeless consciousness of Śaṅkara. Supracortical consciousness is the experiential first step of the brain towards this absolute nonduality consciously assimilating brain-independent consciousness within the system.

What could be the means and ways for this evolution? Seemingly three. There are three great partitions between the 'ordinary' and the 'higher'; the partition of mind, the impervious wall of time and the opacity of death. Therefore the means and ways are as follows. (a) One can go for physical conquest of death (like Sri Aurobindo). (b) One can practice meditation in getting into *samādhi* or yogic trance (like Sri Ramkrishna). This is to make the mind a vehicle of consciousness. (c) One can transcend time by means of surrender to unconditional consciousness (the final common path for everyone).

(a) This supracortical evolution is a macroevolution probably effected by a genetic change in the developmental regulatory genes (in the brain) while the person has been transcending death. Physical conquest of death is humanly possible. The person does it successfully when genes are conducive for it. When one does it successfully, it could be accompanied by change in some of the developmental regulatory genes of one's brain.

(b) The alternate way to death transcendence is to get into the state of *samādhi* through attention, concentration and meditation.

Attention is to get the object into focus. Concentration is a focused scanning of the details of the object. Meditation is 'absorption' of the subject into the object. *Samādhi* is unification of subject and object. When the object in meditation is brain-independent consciousness and the subject is brain-bound consciousness, while the self loses its identity, then *samādhi* state is nothing but an alternative form of physical conquest of death.

Neurologically, attention has a left hemispheric bias. In the course of concentration the being attempts to make the bias nil. Meditation ('absorption') begins when the hemispheric bias is nil and the subject axiologically redefines the hierarchy of the nests in neuraxis in the context of the lovable object of meditation. Meditation cannot continue without this element of love. Love eventually leads to fertilization when a cosmo-cortical harmony is achieved. A perfect *samādhi* is, therefore, a state of the brain when in information processing and in responsivity of the brain one could find (i) nil hemispheric bias, (ii) axial synchrony in the neuraxis and (iii) a cosmocortical harmony.

(c) There is a third way to accentuate this evolutionary process. It is by the process of active conscious surrender of brain-bound consciousness to brain-independent consciousness. Not any amount of scholarship, intelligence or even penance but surrender is the common requisite for transcendence in all bhakti cults of India, also mentioned in the Gītā, in Islam (Islam literally means surrender) and also in Judeo-Alexandrian-Christian traditions.

The process of surrender is of utmost importance in any process of education too. If education is defined as a process to effect desirable change in the behaviour of the learner in reference to knowledge (cognitive aspect of brain function), skill (psychomotor aspect of brain function) and attitude (affective aspect of brain function), then possibly, only the process of surrender in the desired direction could effect a change in the attitude. The objective of surrender is to accept gracefully the situation one is put in. What follows is growth.

Surrender is the process necessary for phase transition from 'form' to 'formless'. In self-metamorphosis of nature, one could notice this process in the passage of any event/object/entity from nest III to nest IV of nature. In science for consciousness, therefore, 'surrender', I mean surrender at the highest/deepest level, may be defined as a process by which one's nature (properties) becomes mother nature (properties).

In science, the word 'surrender' has been introduced by Robert Jahn from the University of Princeton, USA, to explain phenomena. According to him, 'Surrender of properties by quantum object is followed by resonance which may be responsible for anomalous phenomena.' Extending the view, it may be said that the surrender of properties to unconditional consciousness may be responsible for generation of new information, new context and new goal.

One could easily see this serial surrender of properties of 'self', layer by layer, and sheath after sheath, till the nakedness, and then the nakedness beneath nakedness is completely exposed.

- In the nest I of nature, the self is classical self.
- Classical self surrenders classical properties, becomes quantum self (nest II).
- Quantum self surrenders quantum properties, becomes elemental self (nest III).
- Elemental self surrenders phenomenal properties, becomes deconditioned self (nest IV).
- There is transformation in nest IV and self's nature becomes mother nature.
- Inside nest V, self becomes consciousness.

A competent mathematician may try to measure the phenomenon with equations of surrender of the type.

Conditioned Properties $\varphi \ UC \rightarrow In, Cn, Gn$
 where

φ = surrender, UC = unconditional consciousness, In = information, new,
 Cn = Context, new, Gn = Goal, new.

The equation of surrender is supposed to involve higher-dimensional topology, time-matrix and categories of information, its content, propensity and trajectory.

Objective Signs of Evolution in Supracortical Direction

Evolution in the supracortical direction is a death-transcending emergence. When we see people who have had an experience of survival from protracted death in a hospital bed, or had a chance escape from a horrifying death trap or, the refugees of war who had seen light at the end of a long dark tunnel, and all now have a completely changed lifestyle with a broader worldview and a wider and clearer vision and an attitude full of empathy, we may tentatively regard it as a guideline for the trend in the supracortical direction.

Meditation-practitioners undergo experience of *samādhi*. Experience of *samādhi* of varying depths could be equivalent to the experience of voyaging through different depths of the death tunnel. When they are able to come back to the space-time bound world with more perfection and without much embarrassment to their personal, family and social life, it could be said to be another line of evidence for evolution in the supracortical direction.

Evolution in the supracortical direction and the concomitant creativity is a signature of an integrated 'open' brain. Creative people with impeccable axiological integrity could be the third line of evidence in this direction.

Three Milestones of the Being in Supracortical Direction

Three rungs of the ladder of the being in the supracortical direction are supracortical being, supracortical godhead and supracortical autonomy (*Sadguru*).

Common characteristics of the supracortical beings: Supracortical being, supracortical godhead and supracortical autonomy, all three are characterized by three common features: inexhaustibility (within cortical limits), love and creativity. Their difference could be found in their gradation. One could notice brain's graded accessibility to different depths of voids resulting in graded degree of inexhaustibility and graded manifestation of love. Self-transparency in behaviour is accomplished amidst this complexity of being-hood as the brain continues to biologize various constrains imposed by more and more complex value system and aesthetics. In the direction of supracortical being-hood, creativity and aesthetic value exhibit a co-evolution. Autonomy is entrusted to the system perfect. The original imperfect brain gains perfection of the highest level at the station of supracortical autonomy (*Sadguru*).

Supracortical opening offers five right conditions necessary for creativity: (a) The masculine (consciousness) and the feminine (mother nature) components. This could be reflected as the trait of 'independence' and 'sensitivity' respectively in the person. (b) Creative space. (c) A stable value attractor. (d) Positioning at the 'boundary' zone (cortico-supracortical domain) which is far from equilibrium. (e) Operational freedom.

The creative space for the brain following a supracortical opening is literally and practically infinite. The Supreme Biological Homeostatic Centre, the brain of a brain, the Biological Integration Centre is the right value attractor in the chaos and creativity of such a brain. Operational freedom of 'self' for self-organization in various functional and structural strata of the brain is practically limitless. The 'self' of a supracortical being could move in and out of the subjectivity-objectivity matrix and could 'invert' subjectivity into organic objectivity using different dimensions and different elements from the nests of nature. Combined operational freedom and sensitivity and above all the positioning of the operator at the cortico-supracortical boundary that is far from equilibrium offer an unparalleled advantage for creativity. All interesting and exciting events happen on the boundary. And, the boundary between the cortex and the supracortical domain is the most exciting one in the context of further evolution of the present human species.

Specific Characteristics

Supracortical being: He has a stable supracortical root in spite of the fact that he is seen to fluctuate between his cortex and the supracortical domain. He is the being in a formative stage for further evolution in the supracortical direction. He aspires for the best, the purest, perfect and the highest; may get disappointed in failure; but he is never out of the trajectory of evolution.

Supracortical godhead: Two important additional characteristics in his behaviour are appearance of (a) 'magnetic attractability' and (b) contagiousness of the being. His inexhaustible love against the conjugate coordinate of a remarkable discriminative power arms him to draw the flawless decision line in most worldly games. The cortical system of the being has become so perfect that the Supreme Nature, Mother Nature, deems it proper to use his brain as her transmissive organ.

Supracortical autonomy: When one's nature becomes mother nature, one is consciousness. Unconditional consciousness and mother nature are personified in this being. The 'spirit' of this individual is a personal agenda of unconditional consciousness and the 'intent' is that of mother nature. In the spiritual tradition of India the being is Sadguru, exemplifying the culmination of genetic, memetic, informational and personal uniqueness in the process of individuation.

Because of the degree of perfection, his brain has gained complete autonomy even at the highest level of pluralism, in the context of the system of multiple universe(s). He is at absolute ease. No constraint, whatsoever, could be noticed in his behaviour, a first person universal swimming comfortably in the interuniversal essence. An eternal 'yea' and love melting as 'pure disinterested altruism' characterize his behavioural expression.

TRANSITION FROM HOMO SAPIENS TO HOMO SPIRITUALIS MAPPING THE EXTENDED TERRITORY OF HUMAN POSSIBILITIES

In the last century, three great mystics from India independently but unequivocally expressed that further evolution of the present human race is on the cards. They are Pandit Gopi Krishna from Kashmir, Sri Aurobindo and my Gurudev (Akhandamandaleswar Sri Sri Swami Swarupananda Paramhansa Dev). All of them had a common point to

emphasize: humanity is at the threshold of a new formation. The present man is a transitional being. The divine potential and possibilities in man are expected to go into actualities through evolution of higher consciousness. All of the three thought it to be a natural consequence of the journey of consciousness already involuted in the matter. This prior involution, according to them, acts as the main driving force of evolution. From the West, it is the French palaeontologist of the Jesuit order, Pierre Teilhard de Chardin, who has also expressed his conviction that with the earth now undergoing the socialization of compression, humanity has entered a period of the Rebound of Evolution and Neo-cerebralization and is evolving 'Towards more brain'.⁶⁹ Recently, Ken Wilber⁷⁰ from the USA has also voiced in favour of this evolution.

Is evolution towards the supracortical direction an evolution resulting in emergence of a new species on this planet earth? I guess, yes. What could be the basis of this guess? Scientific doctrine of evolution is a reconstruction of the past. On the basis of this scientific experience, one can project the evolutionary line for the future, particularly when some of the advanced human milestones (like Christ, Buddha, Guru Nanak, Sri Ramkrishna, Sri Aurobindo), although far away, are available within the bounds of human scrutiny. Remember the biogenetic principles; 'ontogeny recapitulates phylogeny' (Ernst Haeckel) and 'Ontogeny does not recapitulate phylogeny; rather it creates phylogeny' (Walter Garstang).

Could the process be explained by existing theories of evolution? Probably not! Do we need something new for supporting this view? Certainly yes.

The present theory of evolution takes its cue from Darwin and Lamarck. With inputs from (a) genetics, the phenomenon of random mutation and recombination, and from (b) the model of population genetics, the phenomenon of isolation, migration and drift, it brings out a Synthetic Theory of Evolution. This works well 'within species', I mean micro-evolution, that propounds 'survival of the fittest', and fails considerably to explain the new emergence of species, i.e., arrival of the fittest.

In this context, I am reminded of J. B. S. Haldane's review of Evolution in 1953.

The current instars of the evolutionary theory may be defined by such books as those of Huxley, Dobzhansky, Mayr and Stebbins (the founders of the Modern Synthesis). We are certainly not ready for a new mould, but signs of new organs are perhaps visible.

What could be this new organ? What could be the organ, visible as *sine qua non* for this new evolution? Most likely, it is the brain, a new kind of brain. The brain of the present human race is probably the only organ that is incompletely evolved. Awareness of the brain-bound consciousness for the existence of brain-independent consciousness is certainly a call to the brain to evolve in this direction.

I have devoted a full chapter on this subject in *The Millennium Bridge*.⁷¹ There I have emphasized that this new species would be characterized by development of a new conglomeration of neurons over the vortex of the cerebral cortex involving both the hemispheres.

The question remains, if the arrival of a new species on this earth is on the cards how would one identify this emergence? Would they have one or two horns? One more head? Or, one or two more limbs? Would there be any difference in distribution of melanin in their skin or in iris of their eyes? Would there be a third

eye on their forehead with another optic nerve joining the optic chiasma? Would there be any physical characteristic unique to them? Surely, we would find a unique behavior in their life-style. Certainly, in their expression they would observe the Akhanda view of universe and multiverse. Definitely we would be impressed by their handling of five kinds of mechanics discussed in this presentation. However, one point, which would be unique to them, is possession of the 'brain' of a brain—a collection of neocortical neurons at the highest convexity of the cerebral cortex of both hemispheres. This *brain* of a brain is the sine-qua-non of the new species emerging in our planet

... We have reached a comfortable position to endorse the view that supracosmic Force requires on the ground a platform, a stable center, a conducive receptor in our brain for its action. It is also necessary for its manifestation on the earth. Commensurate with this need the billions of living neurons in the brain with their seven fold supporters, glia, respond appropriately. Of all the organs of the body it is the brain that responds to this call first. It leads other organs and systems of the body to adapt with the situation accordingly. This response of the brain is a biological response, a physiological response, and an evolutionary response. This response of the brain is to stabilize the being at a higher evolutionary plateau, since 'only those contents of consciousness can be developed that correspond to the organization of the brain' (Walter R. Hess).

The chapter is devoted to the details of its formation.

Towards a Scientific Explanation for the Transition of Homo Sapiens to Homo Spiritualis

For explanation of this supracortical evolution, we would like to introduce three new or additional elements in the process of evolution and make three amendments (rather extensions) in the existing synthetic theory of evolution. We would first discuss three additional elements and then move on to the amendments.

Consciousness: Supracortical evolution will be different from all other evolutionary processes we know of in the sense that it is an informed and conscious evolution.

It is unlikely that even during the struggle for existence and natural selection, consciousness does not play any role. However, the subject is not aware of the fact that what is happening is happening for its evolution. A chimpanzee does not know, probably does not need to know, that it is going to evolve into homo erectus and probably homo erectus did not know that it was going to evolve into homo sapiens. Even if we tell a chimpanzee or homo erectus that he is going to evolve, he would not understand it. There is a cognitive barrier, language barrier, existing in communication.

However, there is a process called meditation. Meditation means getting 'absorbed' into the object of meditation. The objective is to become one with the object/subject of meditation. Meditation is in our instinct. However it is not unique to human beings. It is also in the instinct of other animals. The difference is that they are not aware that they are meditating. Eventually in the process of meditation, one becomes what one meditates upon! The process of meditation is, therefore, the process of becoming. If we generalize, the whole process of evolution could be seen as a guided tour of meditation. The history of evolution as revealed today could be said only a part of the autobiography of

consciousness. Human beings meditate; meditate consciously on what they love. When human beings consciously meditate on unconditional consciousness, they evolve towards this unconditionality.

For supracortical evolution, however, the brain has been informed about the existence of brain-independent consciousness and the brain's evolutionary effort is, therefore, consciously directed to harmonize its own consciousness with that on the outside.

Someone like Pandit Gopi Krishna, Sri Aurobindo and my gurudev have already exemplified, personified this evolution in recent India. They have elaborated the pros and cons of the human possibilities in situations where we consciously choose to evolve in a desired direction. We may follow the tract already laid down and as advised. We may engage our wholehearted 'love' for the objectives we are aiming at. We may apply our 'devotion' to the task we have chosen to accomplish. The element of 'love' makes the process smoother and the element of nonlocal communication type II makes it faster. No other previous evolution was so informed and so conscious for the evolver.

What could be the timeframe for this accomplishment to be observable? If microbial life evolved around 3.5 billion years ago, multicellular organisms came into existence about 2.5 billion years ago, the primate 60 million years ago, hominid 3–4 million years ago, and anatomical modern man 50–150 thousand years ago, what could be the time period required for this transition of homo sapiens to homo spiritualis? One unambiguous prediction is available. It is a prediction by an astounding supracortical autonomy from India, a prediction of Akhandamandaleshwar Sri Sri Swami Swarupananda Dev, who used to say, 'I am working for three centuries ahead ... To follow the beaten tract is not my way.' He said that it would be explicit within a timeframe of 300 years, nine human generations! How did he say so? Not from a position of God but from the position of an accomplished human being who has experienced the complete journey and then got engaged in uplifting and transforming his fellow beings.

Developmental regulatory genes: Evolution is a heritable change. It is an irreversible process. Therefore, genetic changes form its basis. Also the heritable genes seem to be the final accomplishment in the infrastructure, for perpetuation of the evolved species.

Scientists have tried to explain the arrival of a new species by means of genetic mutation. This may be true for bacterial life and also for some other lower life forms. However, mutation in genes of higher life forms is not that common. If at all it happens, it is retrogressive and transmitted in a recessive manner. Mutation or recombination within a somatic structural gene has so far been recognized to produce a disease, an anomaly. This has its own place and importance in the discipline of medicine, in both diagnostics and therapy.

It is worth remembering Werner Arber's⁷² statement of caution, 'Evolution does not occur on the basis of errors, accidents or the action of selfish genes.' The genetic engineering of nature that could be responsible for emergence of a new species (speciation) in the kingdom of animals is yet to be discovered.

In the course of speciation, a macroevolution, there are 'discontinuity', 'missing links', and 'ontological gaps'. The farther evolved a species is than its predecessor, the wider is this ontological gap. If the emergence of a new species, which is yet to populate the earth, were on the cards, the visible 'ontological gap' from the existing species would also not be so uncommon. Therefore, in this evolution there is expected to be 'discontinuity'

from the mundane, a wide gap from the routine professionalism, a far stretched leap from our present conditioned existence. It may amount to what we call 'death'.

This is probably what Sri Aurobindo might have apprehended as '*evolutionary crisis*' before the 'descent of supermind'.⁷³ Some evidence of an evolutionary crisis is already manifest. One may notice how our worldly knowledge system having completed the full circle is incapable of leading us further. Educational, social, legal and political institutions built up and supported by ideas divorced from spirit have been gradually crumbling or losing their credibility. Like the life-period of fireworks, many scientific claims are being discredited in an unexpectedly short span of time.

Supracortical evolutionary process is, therefore, meant to neutralize the wave and cycle of extinction, to rescue humanity from getting gripped into a 'fixed form' and to transcend completely this death phenomenon engulfing humanity in different shades.

To 'transcend' means to make sense of an impassable barrier. And this final impassable barrier is the barrier of death. Supracortical evolution in all probability would be a death-transcending emergence and probably, who knows, the required genetic mutation, necessary and sufficient for this evolution could happen during this physical conquest of death while the person passes through an experience of embryonic life in the adult.

Evolution happens when the developmental changes become heritable. The developmental process is mediation between genotype and phenotype. There is never a 1:1 relationship between genotype and phenotype. One genotype could give rise to several phenotypes according to developmental processes.

Man appeared as a result of a one-sided, but not total, improvement of organism, by joining not so such adult apes, but rather their unevenly developed fetuses. From the purely natural historical point of view, it would be possible to recognize man as an apes 'monster' with an enormously developed brain, face and hands.

—Elie Metchnikoff (1891)

Therefore, in consonance with the current Evo-Devo excitement around, may I take the cue from developmental genetics⁷⁴ and strike the appropriate chord for initiating research on supracortical evolution where the predictable likely changes could be demonstrated not in any structural genes but in developmental regulatory genes involving the neurons in general and neocortical neurons in particular, where the learning process begins in the womb.

The desired genetic changes happen, most likely,

- (a) not only in the early embryonic stage of intrauterine life,
- (b) but also following conscious transcending of death in an adult which could usher literally a new 'embryonic' life within the individual's brain.

Two other equivalents of a death-transcending process of the brain, as already mentioned, are (a) the practice of getting into '*samādhi* state' regularly, and (b) the practice of active conscious complete and unconditional surrender of individual's brain-bound consciousness to brain-independent consciousness.

This change in the developmental regulatory genes might lead to a unique networking, with formation of the *brain* of a brain as the highest biological homeostatic centre. The

emergent mechanism where multiple fundamental traits are tossed out to recombine for a new emergence may also play a crucial role.

Nonlocal communication: It is not known what sets off the programme of evolution of new properties to replace the old ones in a system under evolution. Also not known is what makes the system choose a programme far ahead of time to beat others in the competition? Relevant also is what makes this process happen simultaneously on different regions of the earth/cosmos, even when the regions are geopolitically different?

No evolutionist has ever thought or considered the role of nonlocal communication by the system/organism under evolution. I have a poetic expression⁷⁵ on this subject that is worth repeating here.

Buddha said that he was not God, nor Angel,
Nor a Saint. He is 'Awake.'
Darwin saw only struggle and struggle
In all existential quakes!

Lamarck emphasized an internal vital force.
'Appetency' to change with environment.
Hugo's mutation. Or, genetic isolation and drift,
Clonal proliferation and unpredictable recombination.

The common in them, is a locally acting system
Communicating in a non-local way.
Overcoming uncertainty in all its fitness
Integrating information in its biological bay.

Oh! The traveler! There are several death traps.
I wish you get through, with a feather in your cap!
Conscious advance, a little, through Nature's complex recess.
A death-transcending emergence, Evolution is the Process.

'Evolution from within' can take the system to near-death point. At this point, the system, if capable, becomes informationally open and, if further able, overcomes the existential uncertainty by biologization (systemization) of the relevant information from outside the system. Information reduces uncertainty. The meaning of information is, however, read by the system in which it is introduced. Realization/biologization of this relevant information leads to a new integration within the system.

Once 'systemized'/'biologized', the relevant information starts working from within and sets new goals within the system. In this way the system develops a temporary harmony with the outside. Then begins another long journey. Eventually it may again come across a similar situation of threatened death. Whether it would be able to overcome it or not, depends on several probabilities and on the interplay of factors as mentioned above. If the system fails, we call it death. When it succeeds, we call it evolution of the system. The evolved system is expected to have emergent properties which have controlling power over the older ones (Searle's type II emergence).

Nevertheless, the death phenomenon would continue to remain in this world in spite of nonlocal communication acting wonderfully and sometimes dramatically.

Though evolution involves all the nests of nature, its final or permanent imprint is left at the classical nest. The classical nest retrieves all memories and memory-induced changes, and thus, the evolutionary changes are visible within the easy comprehension of senses.

Evolution is, therefore, a mechanism where non-locality and locality unite. In other words, a system that can act locally and has the ability to communicate non-locally reserves chances to evolve.

Non-local communication type III, which is a communication independent of space and time to effect a specific 'purpose'/goal probably sets the conformity of the evolutionary process with the new 'goal'. The relevant information is suggested to be communicated to the brain, to the genes or maybe to the neuronal genes. L. H. Caporale⁷⁶ has mentioned that 'evolutionary strategies themselves evolve in a living situation under the pressure of selection and genes can acquire information from outside that transforms its behavior in a heritable way'. Non-local communication type II, a communication dissolving the barrier of both space and time, acquired by the system during its passage through 'death trap' may offer it the selection advantage over those which have not acquired this integrated ability. Nonlocal communication type I, a communication dissolving the barrier of space, may explain simultaneous happening of the evolutionary process over all favourable eco-milieu.

Three suggested amendments: The existing synthetic theory of evolution stands on the pillars of reproductive success, natural selection and the model of population genetics. A little modification, rather an extension of the viewpoints, is felt necessary to offer explanation for the transition of homo sapiens to homo spiritualis.

1. So far, in the Synthetic Theory of Evolution, we have counted the reproductive success of genes. In this essay we have learnt about the power of memes which could modify even genes. There also exists the possibility that the reproductive success of 'memes' may overtake the reproductive success of 'genes'. Reproductive success of certain memes seems more relevant in the course of further evolution of the cortical being.
2. The theory of natural selection is an incredible success since it is based on evidence from (a) biogeography (spatial distribution of creatures on this planet), (b) palaeontology (temporal distribution of creatures on this earth), (c) embryology (a small natural laboratory where ontogeny recapitulates phylogeny) and (d) morphology (the pattern of analogous, homologous and vestigial organs).

Nevertheless, it is worth remembering that Charles Darwin himself opined, 'I am convinced that natural selection has been the most important but not the exclusive means of modification.' What could be the reason behind this introspection? We could only guess! Darwin's concept of natural selection is confined merely to the classical nest of nature. It does not include the whole spectrum of nature. Nature's deeper nests were unknown to the scientists of that period. It is possible to extend the selection process of nature into the quantum nest, elemental nest and the selection by mother nature. This selection process at the deeper recess of nature is likely to be stricter than that in the classical nest of nature.

3. The phenomenon of 'isolation', population migration, and 'genetic drift' could well be applied in supracortical evolution, may be with minor modifications. In

supracortical parlance of the individual, this could be effected by long-term imprisonment of the person (Sri Aurobindo got enlightenment in prison), long-term isolation of the concerned subject from mainstream power politics (e.g., as happened for more than 27 years in case of Nelson Mandela) or conscious engagement of the person in exploration of nature or consciousness for a prolonged period. This one-pointed cognitive trajectory studded with 'life' and 'death' situations might effect heritable changes in the developmental regulatory genes of the neocortical 'stem cell' of the brain. Also this kind of 'isolation' from the mainstream may help the genotype to manifest with the desired phenotypic maturity. The children born and brought up in the supracortical paradigm would get involved in the expansion of the population matrix.

When one looks carefully on the above-mentioned three amendments, it is obvious that we are leaning towards direct involvement of consciousness in the process.

Concluding remarks on the mechanics of transition: We have suggested three amendments and three additional elements for the synthetic theory of evolution to explain the transition of homo sapiens to homo spiritualis. How much each of these six factors contributes would be our next step of investigation. The role of emergent mechanism also seems relevant and is to be considered.

There is another aspect of this transition. Contact with curd is the simplest and probably the easiest way to convert milk into curd. Contact with a higher conscious being, in a similar way, is the simplest and easiest way to transform a lower being. In case of milk and curd the causative agents are lactobacilli. In case of contact of a higher conscious being with the lower conscious being, the causative agent is live information. Replacement of information content of 'self', by a higher being could initiate changes in the memes and genes of the being who has wilfully opted for transformation.

The question is where are those higher beings, who have the ability to transform the lower mortals like us? I believe if we search for them, we are sure to find one or two of them. Till such time we get them, let us continue our work with their informational content. Let us be engaged with all available scientific methods to hunt for such living information, information which could transform life, information which could elevate us to the platform of higher beings, information which could induce our elevation to the level of unconditionality.

Finally, the Indian mystical view that evolution proceeds because of a prior involution of consciousness in matter merits further deliberation.

Possibility of Acquired Characteristics Being Heritable

August Weismann, a nineteenth-century biologist, showed that even after cutting the tail of mice for 21 consecutive generations, a tailless mouse was never born. This was done long before the dawn of the science of genetics. *Weismann's barrier*, as it is called, works on the principle that hereditary information flows from genes of reproductive cells to genes of somatic cells and not vice versa.^{77,78}

The point that is missing in this interpretation of Weismann's experiment is the absence of involvement of consciousness and its machinery, the 'intention', the 'will', the admiration and 'love' in the whole process. 'Cutting' the tail of mouse or an acquired

specific immune⁷⁹ response (as suggested by Edward J. Steele⁸⁰) is in no way comparable with a 'character' that has been acquired consciously, intentionally, wilfully through the process of admiration and love.

However, to make an acquired character heritable is a time-consuming process. The active presence of consciousness over a few successive generations in favour of the acquired character could possibly make some of the acquired changes heritable. Darwin's selection pressure would be working at the level of several 'uncertainty traps' that are overcome through intention, will, admiration and love. In one single generation, this is particularly relevant in the case where consciousness of the pregnant mother influences the developmental regulatory gene expression in the embryo. This could also be an explanation for prenatal learning (e.g., in the case of Mozart, the prodigiously talented musician, and Abhimanyu, Arjun's son in *Mahābhārata*, learning inside the womb).

While somatic DNA and germ-line DNA act independent of each other, it is quite possible that a live-information integrating 'self', memes and genes could act simultaneously on both. Live-information is not alive without consciousness. When consciousness gets involved, the picture becomes radically different. It is like working from above the height of Weismann's barrier.

There is another piece of experimental truth that could be placed to counter that 'Gene is God' theory. A mutant gene responsible for limblessness in one generation, does not produce the same in all generations. It often produces only a mild thumb abnormality in the next generation. The traditional interpretation is that mutant gene could have been 'diluted' by other genes present nearby. Could be! However, the role of consciousness and even of the environment, which has the ability to change consciousness drastically, could not be ruled out completely in suppressing the manifestation of a mutant gene in the body. The role of mother's conscious experience on the embryo growing in her uterus is, therefore, a rewarding research frontier.

In the context of 'Is acquired transformation heritable?' I wrote⁸¹ in 1985,

- (i) If the element of love is involved in that acquired characteristic, meaning a supracortical touch and its biologization in the habit,
- (ii) If the affair is prolonged, meaning if sufficient period is given for gonadal transformation to occur,
- (iii) If both partners try to unify their consciousness during this interim period, the concerned genes are mathematically heritable.

What could be the mechanism of this soma to germ-line flow of information that is heritable? The answer lies in the mechanism operating from above the height of Weizmann's barrier. For example,

1. Whole body communication system (see following section).
2. Live-information.
3. The relationship between the biochemistry of love and the molecular biology of gene expression.

Besides, there remains the possibility of manoeuvring the developmental regulatory genes by mother's consciousness while phylogeny is being repeated in the ontogeny inside the womb.

There is another point. How can one acquire a character if it is not already there within in involuted form? If we accept the role of prior involution of consciousness in the evolution of matter, then in the picture there is another dimension worth reviewing!

Eugenics: Is It a Dream, Fantasy or an Achievable Reality?

Eugenics is a systematic effort to improve the quality of the human species applying the principle of genetics. To many material geneticists, eugenics is a dream or a fancy^{82,83} of an imaginative mind. Without having used this particular name or form, the objective of eugenics was believed to have been practised by the Vedic and *Upaniṣadic* sages and even by their influential followers in the society including kings and landlords. In recent history Sir Francis Galton, the cousin of Charles Darwin, was the founder of the Eugenics Movement. He assumed that natural selection could be used to procreate qualitatively better human beings in terms of their intellectual ability, social level and economic status. This Eugenics Movement⁸⁴ in the West had wide-ranging impact in social and governmental policy. Its influence changed the immigration law in the USA. It restricted the rights of reproduction of the disabled and people with infirmity. The court of the state of Virginia, USA even advocated sterilization of people on the basis of eugenics. The Supreme Court, USA upheld this ruling in 1927 in the Buck versus Bell case.

It is better for all the world, if instead of waiting to execute degenerate offspring for crime or to let them starve for their imbecility, society can prevent those who are manifestly unfit from continuing their kind. The principle that sustains compulsory vaccination is hard enough to cover cutting the fallopian tube.⁸⁵

This ruling has never been overturned to our knowledge. However, when the Nazis in Germany (1933) accepted eugenics (*Rassenhygiene*) as a part of their social programme, it became overkill. They executed it ruthlessly, crossing the boundary of basic human rights and justice. It was pursued for a political end. The movement fell out of general favour because of its emphasis on the negative side and its ill-defined context and goal.

The scientific snag in this movement was a mistaken assumption that only genes determine the behaviour of the individual (hereditarianism). The similar mistaken assumption could be found in the neural behaviourists' movement where every behaviour was explained by a reflex in the nervous system. Neural behaviourism or genetic behaviourism individually or even in combination, cannot account for many behaviours of human beings. In all three situations, the role of memes, 'self' and consciousness are totally ignored.

The argument crosses my mind that the whole of evolution could be a programme of eugenics taken up by mother nature. A self-conscious human being got this idea merely from observation of nature's mechanics. What has so far happened by the act of nature is likely to be pursued in future consciously by the cortical being. For this, what we need is to set precisely our nature in the Tao of mother nature.

Let me quote from works I have already published in 1985⁸⁶ and 1987.⁸⁷

I mentioned that besides neural and genetic bases of love, there exists another dimension in love, the gonadal basis for love. In the context of 'How to produce a better child than you think you can' I wrote, about the 'Essential Three'.

- (i) Pre-fertilization unification of consciousness of the male and female gametes over a few successive cycles of gametogenesis (in male the duration of spermatogenetic cycle is about 72 days and in female the oogenesis cycle is about 28 days).

Unification of father's and mother's conscious will to reach a consensus on the desirable quality of the child can make it.

- (ii) Learning the technique of getting the best combination out of a given gene quota. It is achieved through love, regard and respect for the values and qualities already manifested in the family tree.
- (iii) Infusion of love in the sex-act itself. The problem of distinguishing 'love' from 'sex' during the sex act for conception is not very difficult to resolve. In love, the pleasure is for the partner. In sex, it is an enjoyment for the self. To empty one's everything for the partner is love. To rob the partner of everything is sex. To accept with grace what has been offered, is love. To revolt for what has not been given, is sex. To give is love. To take is sex.

The possible cause of early abortion of unknown etiology in a normal anatomical and physiological milieu is the absence of love in that sex act of conception. Modern obstetrics speaks of chromosomal or genetic defects in the zygote as an explanation for this early demise. That love causes genetic reassortment has been proposed.

A genuine trial for unification of consciousness of male and female gametes and a conscious meditation on lovable 'quality genes' in partner's parents and grandparents can provide a definitive directive in the genetic re-assortment, recombination and crossing over.

We, therefore, consider a kind of eugenics which is in harmony with the ecosystem of mother nature where all five elements namely, genes, memes, 'self', information and consciousness are held responsible and accountable. This kind of eugenics is relevant to help the transition of homo sapiens to homo spiritualis.

WHOLE BODY COMMUNICATION SYSTEM

Consciousness, information, self, memes, genes and gene products make our life-system work. There are several gaps in this stated hierarchy. Genes and gene products are positioned at the materialistic end of the spectrum. However, from memes to genes or from 'self' to memes and from consciousness to self, the communication system is completely unknown.

Here there is a felt need that in science we take the responsibility to build up the whole body communication system.

At the present state of knowledge, we know of only two systems, the nervous system and the hormonal system through which the whole body communicates. The nervous system gets the immediate spark and responds accordingly. The hormonal system acts slowly and prepares the body system to adapt to the situation. Though the nervous system and the endocrine system are given wider coverage in the discipline of medicine, it is felt that, in all likelihood, there exist several other communication systems in the body.

Research in the last century has pointed out that there are four emerging communication networks in the body in addition to the nervous system and the endocrine system.

1. *At the Molecular Level*

There are numerous cell adhesion molecules discovered in the body that are responsible for communication in the developmental period. For example, neural cell adhesion molecules,⁸⁸ other cell adhesion molecules, substrate adhesion molecules (SAM) (e.g., fibronectin, cytoactin, cytoactin binding proteoglycans), cell junctional molecules (CJM). This family of molecules has an evolutionary background and could be traced from invertebrate to vertebrate and is important in topobiology where the spatial location of a cell determines its structural organization and functional differentiation.

Since emergence of a new species from the existing species will have developmental genetics involved in the process, so these molecules are likely to play their respective role.

2. *Bioconductive Connectional System*

Prof. Franco Bistolfi,⁸⁹ establishes an amazing connection of histomorphology, chemistry, biophysical structure, solid state physics and finally, 'Life in electromagnetic pool' through this bioconductive connectional system (BCS). Four components of BCS, according to him, are the cytoskeleton, intercellular junction, integrin receptor on the cell membrane and intercellular matrix which, hitherto considered only a mechanical support to the parenchyma, has been found by him to be actively involved in conduction and transduction of signals (piezoelectric, pyroelectric and photon/phonon transduction). He also mentions that BCS has some overlapping with Kroy's third cybernetic system.

3. *Network at the Electromagnetic Level*

Bjorn Nordenstrom^{90,91,92} from Sweden proposed the existence of biologically closed electrical circuits (BCEC) and vascular interstitial closed electric circuits (VICC).

BCEC are established because of ionic plasma of blood circulating in a closed system of vascular channel. VICC is its extension loop in the extravascular system. The blood is not only the active connective tissue of the animal system, its ionized plasma forms a closed electromagnetic circuitry in the body which may be considered as a subsystem of the larger electromagnetic network in the cosmos.

4. *Connectivity through Morphic Field of Rupert Sheldrake*⁹³

The morphic field theory deserves due consideration by scientists to get it accepted in hard-core science.

Besides these four emerging networks, there are three more proposed communication systems in the paradigm we are in.

1. *At the Psychic Level: The Psychic Skeleton*^{94,95}

When we extrapolate the five elementary phenomena in cell biology, and say that the cell membrane represents love, DNA-replication apparatus sex, DNA-transcription and protein synthesis, life, lysosome the ego, and mitochondria death, we find a pentagon of cell psychology.

The pentagon of one cell is linked with the pentagon of the neighboring cell through the bonds of love and sex, the bonds of sacrifice and expectation.

The highest in the hierarchy are the cerebral cortical neurons. Their bonds for love remain ever open in the cosmos. When the cells in the sole of the foot become aware

of the fact that their neural representatives have a supracosmic connection, then only do the supracosmic things become earthly.

The systematic conditioning of the infrastructure of the body along the psychic skeleton for making it conducive for grace by repeated practice of inner journey along a well-defined pathway, is relevant in the maintenance of psychospiritual health. This done correctly abolishes disease and brings positive health.

2. *Communication at the Prāṇic Level*

Through the live-information, from cell to cell, from tissue to tissue, and between the inside and outside of the brain.

3. *Communication at the Ātmaṇic Level*

Envisaging a massive divine manifestation on this earth, as part of His total scheme of development of potential and possibilities in the present human species, Akhandamandaleswar Sri Sri Swami Swarupananda Pramahansa Dev⁹⁶ (author's Gurudev) disclosed to his followers the route of this inner journey to make the body conducive for the divine.

It begins with detachment of the dweller (the self-consciousness, the *ātman*) from the dwelt, the human tabernacle. The 'self' imbibes divine love, meant for manifestation through this body as sacrifice for the entire ecosystem.

The journey of 'self' commences from the perineum, the root of genital organ. The 'self' travels down along the left leg to the individual toes, then moves up along the waist, spine and curves down the left arm, hand, fingers, moves back to the spine up to the head, a clockwise rotation around the vortex of the skull and then comes down through the neck, right upper limb, fingers, back up to the spine, then waist, right leg and finally back to the point from where it started.

During this journey, the 'self' infuses the zeal for sacrifice into every possible anatomical and physiological plane/nest, to every tissue, cell, molecule, atom as desired by the divine. A sense of surrender to prepare oneself as the instrument for manifestation of the divine, conditions the body for the same.

The journey may be continued as many times as desired, with spine in anatomical position and legs in lotus posture. It may be preceded by some perineal exercises.

For women, the route of the journey is said to be reversed. It moves up along the right side of the body, turns anticlockwise on the vortex of the skull and comes down along the left side of the body.

Following is a comprehensive table⁹⁷ for the whole body communication system.

The Whole Body Communication System

1. As exists in medical physiology:
 - (a) Neural Communication System
 - (b) Humoral Communication System
2. Emerging networks for whole body communication:
 - (a) Network at electromagnetic level: BCEC & VICC (Professor Bjorn Nordenstom)
 - (b) Network at solid state level: BCS (Franco Bistolfi)
 - (c) Network at field level: Morphic field (Rupert Sheldrake)
 - (d) Molecular network through CAMs, SAMs, CJMs (Gerald M. Edelman)

3. Additional proposals in the present paradigm:

(a) *Ātmanic* level: Jaganmangal paribhraman (the originator of the *Akhaṇḍa* Paradigm)

(b) *Prāṇic* level: Through live-information

(c) Psychic level: Psychic skeleton

All of these proposed three are 'open' to the supracosmic plane through the top of the brain.

It is our duty and responsibility that we develop these four emerging communication systems and also explore the proposed three further to understand, first, the body physiology in depth; second, the development process further; and third, the supracortical evolutionary process we are dealing with.

CREATIVITY: THE SIGNATURE OF CONSCIOUSNESS

We have discussed five situational conditions necessary for the creative process in the context of the supracortical opening. New creation is a feature of an open system. Creativity involves art (humanity), science and spirit. The discipline that accommodates all three is the discipline of consciousness. Creativity is the most powerful language of consciousness. Essentially, a new creation is the signature of consciousness.

The first important feature of creativity is that it speaks for itself. It is morally autonomous. It stands on its own and works in its own way. A creative manifestation, the complex product of self, memes, genes, information and consciousness is characterized by its (a) newness (originality) and (b) appropriateness (utility). Its novelty may be immediately striking. However, regarding utility, which is related to its intelligibility it may be ahead of its time.

The creative process involves all four elementary strings of consciousness, namely, space, time, purpose, and *ānanda* (experience). Here is a tentative algorithm for this process.

Algorithm for New Creation

When more than one facts, things, thoughts, ideas, events or phenomena tend to occupy identical space in identical time, the possibilities are two.

1. When their information content, therefore the meaning, and the dynamic propensity of contained information, therefore intentionality/purpose, remain identical.

In such circumstances, they merge into one, become one. The best example of this is the merger of brain-bound consciousness with brain-independent consciousness following death.

2. When their information content and the dynamic propensity differ, and therefore the intentionality/purpose clash.

There are two possibilities again.

(a) There is violence. Consciousness decides not to intervene in the process.

It leads to mutual destruction, annihilation of the elements in conflict.

(b) The dynamics of their contained information clash in a nonviolent way.

There are two trajectories again depending on the relation of conflicting information content to time.

- (a) Conflicting information does not have the ability to transcend time.
There is no question of intervention by consciousness.
 - (i) Conflicting information intertwines with irreversible time on a nonlinear dynamics.
Chaos, etc.
 - (ii) Conflicting information intertwines with reversible time on a linear (and nonlinear) dynamics.
Corruption, etc.
- (b) Conflicting information has the ability to transcend time.
 - (i) Conflicting elements 'surrender' their individual properties to consciousness. Artistic manipulation begins. Various combinations of transformed, semi-transformed, and non-transformed properties are explored for several new formations. Consciousness lets those concur with the experience. Should it concur, there is *ānanda*. Consciousness decisively intervenes. It projects itself, extends itself, and participates in the process of becoming.
New creation.
 - (ii) No surrender of properties.
Quiescence prevails. (The elements are in 'limbo')
The conflicting elements may have the following fates:
 - Natural death.
 - Roll back to the mode of old time.
 - Surrender to consciousness and then join the creative process.

This creative outpouring of the individual is the product of consciousness, self, genes and memes exchanging information in an open system.

CONCLUSION

Individual and the Whole

The individual and the process of individuation are basically indivisible from the 'Whole'. How big is this 'Whole' determines how 'big' this individual may ultimately become! Once we set our Wholeness in the essence of the multiversity, individualism has the chance to grow up to the level of a universe and express universalism in its fullest form without getting into any kind of contradiction within the system. The individual is then indivisible (*akhaṇḍa*) from the largest comprehensible Whole, the multiverse. This individual is the first person universal swimming comfortably in the inter-universal essence. Planetary influences on the individual, if any, are to be read in the context of this inter-universal essence.

In this individual, 'self', memes and genes are subsystems within several nested systems where the final system is an open-ended one. Important methods of communication within the system are local, holographic and also nonlocal. Individualism, universalism and consciousness-as-such are in harmony in this individual. Expressed in the language of B-schools, what one achieves is servant-leadership, a personification of both top-down and bottom-up knowledge and the process.

The Individual Is Remembered by His Decision-Making Ability

The individual is eventually remembered for his decision and the decision-making ability. This is particularly so when the decision is transformative and/or creative. The decision is the outcome of a complex information processing within the brain. In an ordinary brain, information processing shows (a) a hemispherical bias (left brain versus right brain, categorical hemisphere versus representational hemisphere), (b) a large extent of hierarchical asynchrony (between reptilian brain, mammalian brain and 'human' brain) and (c) cosmo-cortical difference (difference in information processing in the nature outside the cerebral cortex and information processing within the cerebral cortex). In the individual embedded in the essence of the multiversity, the above-mentioned bias, asynchrony and the difference are minimized to insignificance. And the decision from such an individual remains as the light of guidance for the entire humanity.

This decision is the product of consciousness, 'self', information, genes and memes.

Individuation Is an Integral Process

Individuation is an integral process. But, what do we mean by the integral? 'Including everyone' 'excluding none', 'all-comprehensive', 'balancing and proportioning all' are too stupid to be the expressions of the process integral. For integral of A, B, C, D, if $A^2 B^2 C^2 D^2$ or $A - B \times C \div D$ or any other possible arithmetic, geometric or algebraic expression of ABCD represents the outcome of the process, we are far away from what could be called an integral! We may get an ensemble of ABCD of varying complexity but not an integral. Certainly we are missing the point somewhere.

Sri Aurobindo, the towering mystic from India of the twentieth century could be cited as an example of personification of this integral process who has demonstrated the practicality and utility of the idea and the concept in his integral yoga, integral vision and integral approach to almost any problem of the mankind.

Ken Wilber,⁹⁸ the modern-day philosopher from the USA, has imbibed this idea from Sri Aurobindo.⁹⁹ He has popularized this concept in America and used it extensively in his personal development and therefore also in the fourth phase of his writings. He has an integral institute in USA today. His propositions for an integral university and for development of integral medicine are gaining acceptance. He builds up integralism on his four-quadrant model; individual, collective, interior and exterior. Individual-interior is intention. Individual-exterior is behaviour. Collective-interior is Cultural. Collective-exterior is social. One has to consider all four quadrants, at all levels, in all developmental streams and at all states. Therefore, it is called AQAL (short form of All Quadrants, All Levels, All Streams, All States) model.

Judged critically, Wilber's proposition is a scheme. It makes an intellectual beginning. Any integral model, even when developed independent of this scheme, necessarily should cover all the quadrants mentioned in this scheme. Here lies the strength of this scheme.

On this scheme, people have been trying to build up models. Unfortunately with little success. Why? The causal force for effecting an 'integral' is conspicuous by its absence in this scheme. Development of an 'integral' is not merely an intellectual endeavour. Essential for its development is the causal factor/agent/force. What is this causal agent? We suggest that the casual force for integral development is nothing but the executive front of consciousness what we have called the nature of consciousness, the nature of all natures, *natura naturans*, mother nature.

Without understanding the terrain of mother nature, without understanding her mechanics, and whims, fancies and priorities how would we be able to develop the 'integral'? In anything 'integral' has to happen, mother nature has to be involved as its producer and director. Therefore, all 'integral' have to be subservient to her, the wise and the mighty and with the rhyme perfect.

Mother nature is not under anyone's control. She could not be made amenable to the intellect of scientific procedures. What do we do then? If A, B, C, D are to be integrated as 'integral' how do we go about it?

Individuation Is the Outcome of the Cascade of Integral Process

Integral process is constituted by the following five steps working like a cascade.

1. *The first step is the lifting of the partitions in between the constituents:* The first hindrance to any integral process is the boundary between its constituent ingredients. As long as the constituents aspiring to become integral remain compartmentalized, how can one expect integral development? Removal of the boundary is, therefore, the first requirement for an integral process to start. In the laboratory of an integral development, partitions are not necessary.

What are these partitions? These partitions in the absolute sense are the barrier of mind, obstacle of time and the opacity of death. Mind gate, time gate and death gate are to be opened up to allow the ingredients to play together for an integral development.¹⁰⁰

2. *Letting the constituents interact freely among each other:* Once the boundaries are removed the constituents are no longer separated. They are free to interact with each other in all possible terms and conditions. It is different from a transient interaction that finishes on time and following which the constituents depart retaining their respective individuality! The interaction should continue without any boundary of vanity and sanity till the desired goal is reached.

As long as the expression naming A, B, C, or D is retained, it is certain that the compartments are also retained. Boundaries are still identifiable. The walls are not completely broken. The only way to proceed, therefore, is to complete the work so far done half-heartedly. Let the aspiring constituents mix without any boundary of vanity and sanity.

3. *The churning must pass the test of integrability:* Are all aspects of all ingredients integrable? May not be! There might be some parts that are non-integrable! The non-integrable part(s) must be purged out.

The 'self' of the integral system co-evolves with the process of churning. The self of this self-organizing process remains open to information and assimilates the integrable elements and discards the rest.

4. *Loss of respective identity by the constituents:* If A, B, C, D have been heading for an 'integral', then the final outcome could not be identified as A, B, C or D. There will not be any exact remains of A, or B, or C, or D. The question is, could A, B, C, D stand through this existential crisis? If the outcome is not A, not B, not C, nor D, what is it then?

5. *Integral leads a new creation*: The outcome of the integral process is not an arithmetic, algebraic or geometric expression containing A, B, C and D. It is 'X', the unknown, manifested as a new formation at the end of the integral process.

New creation is an inevitable outcome of the process that is integral. It is unpredictable, nevertheless spontaneous in appearance. In every flesh and bone the outcome bears the smell of newness. The meaning gets changed, the context gets changed, and the purpose gets changed. The integral new is morally autonomous and speaks for itself. It does not need any introduction. Nor does it require any caption for description.

Some Examples of an Integral Model

The series of life-forms in nature are glaring examples of integral models. The 'Layers of Mind' as described by Sri Aurobindo is an integral model for understanding consciousness. I may also humbly submit that the models like *consciousness in dozen of word*; *five nests model of nature-consciousness*; *seven-strata model of mind*; and *the model of inter-conversion of energy, field, form, information, casual currency and life* in my work could be cited as examples of integral model.

How Does One Recognize an Integral Model?

The differences between integrated development and integral development are given in a table in Appendix III. It is often observed that both transcendentalists and materialists have difficulties in recognizing and appreciating any integral model. Only those who are expert in integralism could recognize an integral model. By 'expert', I mean those who have integral cognitive vision and integral understanding of phenomena and events.

There are certain characteristics of an integral development. For example, irrespective of whether one takes the position of a-priori or a-posteriori, an integral model will look complete. Transcendentalization of nature and naturalization of the transcendental are seen complete here.

While analysing an integral model, either by above-downward or below-upward approach, one is likely to get stuck in the middle, since at the centre of it remains so-called 'death'. An integral model incorporates the 'death' phenomenon at its core. The model seems to transcend death and naturalizes death. Model's superstructure is a result of transformation through death. Model's infrastructure seems to be a preparation for transcending death.

As stated earlier, integral model always radiates a smell of 'newness'. Even if it is not intelligible at its birth, it is not easy to dismiss it outright. The sensitive people feel that 'there is something in it'!

An integral system is an informationally open system although it has a state-specific perfectness and completeness in every phase of its formation. One gets the hint of such a view by looking at the series of 'life-forms' in the evolutionary tree. Every life-form has a phase specific perfection but seems to open to further development into the complex form of higher perfection.

The description of integral involves both the structure and a process within. What is holistic today may not be holistic tomorrow. What is 'all-inclusive' at present may be found to exclude many in its new phase of developments. The 'integral', because of its informational openness and a rolling process within, and because of its complete mastery over the so-called partitions, seems to be the most appropriate description of the situation where we are dealing with the divisions of the indivisible (*akhaṇḍa*).

To conclude, the individual is an integral of self, non-self and supreme Self (consciousness).

EPILOGUE: AN IMPORTANT CONVERSATION

- Mr X Hello, Dr Mukho, what are you doing?
 Dr M Me, Myself?
 Mr X Yes!
 Dr M My 'self' is busy collecting some important information.
 Mr X For what?
 Dr M I would like to produce some pregnant memes.
 Mr X For what?
 Dr M For transforming the gene pool of humanity.
 Mr X Oh! You are trying to invent the mechanics of cloning on a mega scale, manoeuvring the information content of self!
 Dr M Maybe!
 Mr X What do you expect from your cloned humanity?
 Dr M I expect them to swim comfortably in the essence of the multiversity.
 Mr X That's all?
 Dr M That is not all. That would be a new beginning.
 Mr X How?
 Dr M Let us have a few of them. You yourself would see the trend then!
 Mr X What is your expectation about this trend?
 Dr M Co-creation and co-evolution.
 Mr X I didn't get your point!
 Dr M Co-creation by the accomplished. Co-evolution of the aspirants.
 Mr X Fantastic!
 Dr M It is neither fancy nor fantasy!
 Mr X I didn't mean that!
 Dr M I know. In fact, it is ideal-real.
 Mr X Simultaneously Idealistic and Realistic!
 Dr M Yes. Also, simultaneously spiritualistic and materialistic.
 Mr X It is integral!
 Dr M Integral of self, non-self and consciousness.
 Mr X Individual is an integral of non-self, self and consciousness.
 Dr M This is 'not the end'. 'Na-iti', 'neti' of the *Upaniṣads*.
 In fact, it is a new beginning.

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 'What good fortune for the Government, that the people do not think'
 —Adolph Hitler
 'The job of the natural scientist is to make the discoveries; and that of the technologist to develop application; and that of the humanist is to suggest whether, how, and under what conditions the work of the other two ought to be applied.'
 —Werner Heim, Biologist
 'Technological progress is like an axe in the hands of a pathological criminal.'
 —Albert Einstein
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'Intelligence is not like new energy source. The presence of an intelligence manifests itself via the presence of or the creation of states which are *a priori* extremely unlikely: ... intelligence manifests itself by making certain unlikely situations appear.' (B.D. Josephson, 2004, 'Science and Religion: How to Make the Synthesis?', T.D. Singh (ed.), *Seven Nobel Laureates on Science and Spirituality*, Bhakti Vedanta Institute, Kolkata, pp. 51–63.
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99. 'Aurobindo thus stands as one of the great founders of integral spirituality and integral practice. All subsequent attempts at such integrative efforts must, I believe, at least acknowledge Aurobindo's enduring genius and in many ways still unsurpassed efforts. His influence at home and abroad has been, and continues to be, enormous.'—Ken Wilber, in the foreword of A.S. Dalal, *A Greater Psychology* (ed.), 2001, New York: Putnam, p. viii.
100. These three barriers exist between the cerebral cortex and the supracortical domain too. A gating mechanism has been proposed to exist at the level of cortical synapses in the context of supracortico-cortical and cortico-supracortical communication that happen between the nature of brain-bound consciousness and the nature of brain-independent consciousness.

It is called 'mind' gating since by manipulating the mind through the practice of meditation and yoga one can induce facilitation in these synapses. If the mind is not focused on achieving this goal it is impossible to tap this kind of supracortical information.

It is called 'time' gating because there is an impossibility of breaking the 'time' barrier as existing across this information transfer. The practice of surrender, conscious, complete and unconditional surrender of brain-bound consciousness to brain-independent consciousness could help opening up the 'time' gate. The last one is 'death' gating because this gating mechanism is made open when the brain encounters the phenomenon of death and decisively fights it out. The passage of the brain through the voids and tunnels of death during conscious physical conquest of death could open up this gating mechanism.

APPENDIX I

Chromo- some No.	No. of Genes	No. of Base pairs (millions)	Disease Association Some Examples
1	3000	240	Prostate cancer, Alzheimer's disease, Porphyria C. tarda, Glaucoma
2	2500	240	Colon cancer
3	1900	240	Colon cancer, Lung cancer
4	1600	190	Parkinson's disease, Huntington's disease, Narcolepsy
5	1700	180	Asthma, Spinal Muscular Atrophy
6	1900	170	IDDM-1, Hemochromatosis, Epilepsy
7	1800	150	Obesity, Cystic fibrosis
8	1400	140	Burkitt's lymphoma, Werner syndrome
9	1400	130	Malignant melanoma, CML
10	1400	130	Refsum disease, Gyrate atrophy
11	2000	130	IDDM-2
12		1600	130 Phenylketonuria
13	800	110	Retinoblastoma, Wilson's disease, Breast cancer (BRCA 2)
14	1200	100	Alzheimer's disease Alpha—1 antitrypsin deficiency
15	1200	100	Marfan syndrome, Tay Sach's disease
16	1300	90	Alpha-thalassemia Polycystic kidney disease
17	1600	80	Breast cancer, BRCA-1
18	600	70	Nieman Pick disease, Pancreatic cancer
19	1700	60	SCID, Atherosclerosis, Myotonic dystrophy
20	900	60	ADAase deficiency
21	400	40	Amyotrophic lateral sclerosis
22	800	40	CML, DiGeorge syndrome, Neurofibromatosis
23X	1400	150	PNH, Duchene's muscular dystrophy
23Y	200	50	SRY, Testis determining factor

APPENDIX II
THE GOVERNMENT OF INDIA'S STAND ON GENE THERAPY
AND HUMAN CLONING

With the approval of the Minister of Science and Technology, Government of India, a National Bioethics Committee was constituted in November 1999. They formulated the Indian position on gene therapy and human cloning as follows:

1. Somatic cell gene therapy research and service may be done with appropriate safety measures. Gene therapy may be undertaken when it is the only therapeutic option or it is indisputably considered superior to other existing options. Appropriate protocols as developed by Department of Biotechnology, Government of India must be followed.
2. Considering the present state of knowledge, germ line therapy in humans shall be proscribed. However, research on embryonic stem cell biology may be undertaken with adequate safety measures.
3. As a principle, human cloning shall not be permitted.

APPENDIX III

	Integrated development	Integral development
1. Self	Often informationally closed	Informationally open
2. Partitions	Exist	Functionally dissolved
3. Outcome	a) An arithmetic, algebraic or geometric expression of a complex ensemble b) Looks like a monster	a) Individual elements losing their original position and acquiring a new purpose, new context and new meaning b) Looks like a new creation
4. Intelligibility	Intelligible	Less intelligible
5. Masculine/Feminine component of Reality	Masculine component predominates	Perfect blend of Masculinity and Femininity
6. Example	Ravana Ten heads, ten brains, two hands (dimensions), closed 'self'. Similar area of brain works in ten brains.	Goddess Durga Single brain, working 100 per cent. Access to ten dimensions. Self is informationally open, in communion with the cosmos.