

# THE HARMONIZER

Science, Philosophy, Religion, and Art  
All Branches of the Same Tree of Knowledge

November 2013

## Editorial Board

### Editor-in-Chief:

Sripad Bhakti Madhava Puri, Ph.D.

### Editors:

Bhakti Niskama Shanta, Ph.D.

Bhakti Vijnana Muni, Ph.D.

Syamasundar Das, BA (Hons) Arch.

Jadu Krishna Das, BS Chem. Engr.

### Layout/Design:

Jayadeva Das, BA Art Ed.

### Links:

Previous Issues

Skype Conferences

Subscribe to mailing list

Darwin Under Siege

Sadhu Sanga Blog

Submit comments, questions, and articles via email to Editors

## Donations

via PayPal or IPN

International Conference  
**Is Science Able to  
Explain the Scientist?**

December 8, 2013

Organized by

Sri Chaitanya Saraswat  
Institute, Bhakti Vedanta  
Institute of Spiritual Culture  
and Science and  
Synergy Institute of Technology

For further information please visit  
[http://bvices.org/scsi/conferences/scienceandscientist\\_03/](http://bvices.org/scsi/conferences/scienceandscientist_03/)



## Natural Intelligence and Teleology in Plants – Part II

**Bhaktivijnana Muni, Ph.D.**

### 1. Consciousness comes back into modern biology as the Concept of Living Form

Due to the work of a great number of plant and animal biologists, including the work of McClintock, biology has discovered two irreducible features which are life's distinguishable features: (1) They are Intelligent, meaning they are purposive and, (2) They exhibit cause/consequence circularity. Last year the *Cambridge declaration of consciousness* held that all animals were conscious and display intelligent behavior. [1] One consequence of the cognitive revolution in biology is the confirmation of the teleological arguments of Kant which were later substantiated by Hegel. Although Darwinists talk of teleology in terms of Natural Selection, in reality it is irrelevant to Hegel's description of natural teleology. Hegel's description is based on the observable evidence of dynamic living phenomenon, whereas neo-Darwinists rely on a presupposition which has been shown to be an error of judgment about the historical development of the living organisms and the living process.

Modern Biology has no ground for establishing any law for intelligence through necessary connections in mechanical systems. Crick dogmatically pursues the idea that the origin of consciousness was explainable in molecular terms. Yet he is unsure, when he claims, "... the brain is very good at detecting apparent causation. Exactly how it does this is more controversial. The main mechanism is probably Hebbian, but Hebb's seminal suggestion needs to be expanded." [2] Hebb was primarily concerned with the cortex and his rule is like one component of an algorithm [3]. It cannot be said that it is any ontological explanation about the origin of consciousness from neural networks or synapses. The pioneering neural cartographer, the renowned Canadian Brain Surgeon Wilder Penfield (Figure 1.) said,

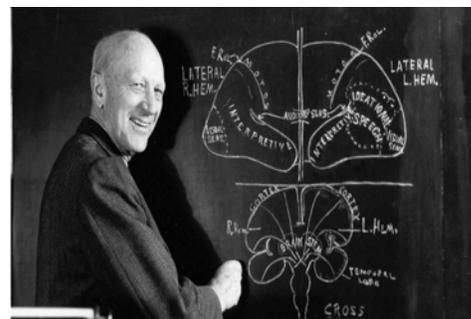


Figure 1. William Penfield

"it [Consciousness] is not in the cerebral cortex! ... I am forced to choose the proposition that our being is to be explained on the basis of two fundamental elements ... mind and brain as two semi independent elements [4]."

## 2. Kant's Teleological Understanding of Life

Kant gave a teleological explanation to organisms and called them *Naturzweck* or embodiments of Natural teleology. *Naturzweck* is different from artifacts or *zweck* [5]. There are two questions posed in Kant's argument of natural teleology: (1) What is it?, and (2) Can we have a knowledge of it? Organisms are natural ends, and can never be described in mechanical or chemical terms. Kant said, "There will never be a Newton for the blade of grass [6]." Consumption/digestion of nutrients and reproduction lead us to consider that organisms are natural teleologies. Kant concluded in nature (natural teleology) the part/whole relations are so demanding a concept that we can never know if anything meets those requirements [5, 7]. Each part must form others, or parts are combined into whole by being reciprocally the cause and effect of their form. Kant thought that real causes or purposes cannot precede them because that will mean it influences its own causes. Parts are possible only through their relation to the whole. An end must be comprehended by an idea that determines everything that is contained in it quite *a priori* [7]. In this way for Kant, any knowledge of Natural teleology is denied, except as *a priori* ideal or first representation. But we could say that such thing as natural teleology exists only because we observe reproduction and consumption/digestion of nutrients by organisms.

## 3. Hegel's Substantiation of Teleology proposed by Kant in the *Gattung* or Kind

However Hegel substantiated Natural teleology by showing that the ground for it is there in Kant's own analysis. Hegel has three requirements for natural teleology: (1) Reciprocal relations between part and whole, i.e. all members are reciprocally momentary means as well as momentary ends. This is the principle of *self-preservation*, (2) *assimilation* from environment by which the system of life maintains, develops and objectifies itself, and (3) *reproduction*, i.e. all organisms must also pursue

self-preservation by reproduction by producing itself as another individual of the same species. In reproduction the determination of the entire structure of the organism is manifest. This is the genus-process or maintenance/preservation of the species and is called *Gattung* or kind by Hegel. This results in natural teleology - as a system of activities which is actualized into a system of organs through which those activities proceed. The living thing is in this way articulated purposefully as a natural teleology. All its members serve only as means to the one end of self-preservation. In Kant's analysis there was no mediation through which we can comprehend the genesis of a teleological system. It remained only as an immediate presupposition which was not yet authenticated by the living individual itself. But Hegel has given us the focus of self-preservation, within the representation of species [5].

Hegel explained that organisms did not have parts but were manifolds of members. Members are what they are only by and in relation to their unity, meaning they are means to the end or purpose of the whole. Neither mechanism, nor chemical substances fit the analysis of life as they do not have internal ends as in life and hence cannot form any natural teleology. What the evolutionists describe about organisms in terms of physics and chemistry is a dead thing, it is never living. Only a genuine internal purposiveness can grasp it. Yet Hegel's teleological explanation does not defend or need to defend the historical development or the evolutionary history of organism. It was irrelevant to the problem left by Kant. Hegel thereby leaves no reason to doubt that we can know that there are indeed living organisms and brings it to the sensible realm [5]. These are quite unlike non-living matter or artifacts. The proponents of natural selection and evolution can be called as another kind of neo-teleologists. But they cannot give any robust causal explanation. Hegel's teleological argument is defensible even without a need for any view of the historical development, yet Darwin's Natural Selection is essentially a statement of the historical development of the organism. The burden of proof of that then lies with the

Darwinists to show how chemicals could ever give rise to life which exhibits natural teleology as self-preservation. This is Hegel's strength and Darwin's weakness that is confirmed in advanced cognitive features of biology.

#### 4. Aristotle's Hylomorphism as the Concept of Living form

In *de Anima*, Aristotle approached the concept of life from empirical observations [8]. Hegel praised Aristotle's work, '*On the Soul*' as "*by far the most admirable, perhaps even the sole, work of philosophical value on this topic*" [9]. Aristotle considered that soul was the first principle of living things and acquaintance with the thought of soul makes a great contribution to the truth of everything and especially to the study of nature. He categorized three nested degrees of soul corresponding to growth and nutrition, perception and locomotion, and intellect respectively: Nutritive souls (plants), sensitive souls (all animals) and rational souls (human beings). This is a non-Cartesian picture where initial life is a potential or a concept, where the living entity exists and comes out. Entelechy is the stage of development or process by which a potentiality becomes an actuality. Actuality is something like teleology of Kant and is self determined. What comes out of the potential is already within the potential and is nothing new. The concept of life in a potential form becomes actualized by necessity. Biology follows *hylomorphism*: its matter and form is inseparable, and always united in the potential and actual form. Real substantial being is the determinate being. For example human being is distinct from every other kind of being and so are bacteria, animals and plants, every species representing a distinct *hylomorphic* body-form. We will not be able to scientifically transpose a species, e.g. bacterium to some other species. However some adaptability and development is there, but that constant restless alteration is bounded, but pliable within the boundaries that do not cross its species line. Species are conserved in nature but Darwin came with a wild thought that species become divergent. But there is neither any actual evidence for Darwinian evolution nor abiogenesis. Non-living matter does not possess the living potential and there is no evidence.

#### 5. The Pancha-kosha Model of Vedanta in Indic tradition for Living Form

In Vedanta, species have been categorized according to their degree of consciousness as well as their body/form. This is the object/subject unity of a proper understanding of nature. Sankya of Vedanta calls for a subtle/gross conception of matter. There are 8.4 million species of life [10]. There are 900,000 forms in water, 2,000,000 forms of trees and plants, 1,100,000 forms of insects, 1,000,000 forms of birds, 3,000,000 forms of beasts and 400,000 species of human beings. According to Manu the trees have the feelings of pain and pleasure similar to ours and their souls are not of a lower standard [10]. Yet their consciousness is not yet developed to the extent of animals and the still higher category of human beings.

The species categorization in Vedanta is based on the consciousness that a particular soul is attached with. The different species are categorized as five *koshas* or stages of consciousness, (1) *annamaya*, (2) *pranamaya*, (3) *manomaya*, (4) *vijnanamaya* and, (5) *anandamaya koshas*. These five stages are hierarchical and are nested. The *annamaya* stage is the feeding stage and is common to all life forms in the world. This was also understood by Aristotle, when he explained that the nutritive stage is common to all life. According to Sripad Madhva Acharya, the suffix '*maya*' indicates *pracurya* or sense of profusion in relation to Brahman or Spirit w.r.t. terms like *anna*, *prana*, *manah*, *vijnana* and *ananda* in the *Upanisads*. All these five forms of *Brahman* are to be taught as immanent in different *koshas*. *Anna* (food) is defined as "that which eats the creature and is eaten by them." This becomes clear when we get the knowledge that all living entities are dependent on *Brahman* or Spirit. Similar analysis of *pranamaya* will signify *Mahaprana* etc. This is clear from the statements of Brahma, "Know *annam* to be *Brahman* ..." etc [11]. *Pranamaya* stage is the immediacy of living symptoms, it is found in the vitality of living organisms. Plants, animals and humans have the potential for self-recognition to different degrees. *Manomaya* stage is the mental stage. Human stage is more advanced than plants and animals although all contain in degrees some mental or cognitive quality. It produces mental speculations among human beings leading to different cultural identities. *Vijnanamaya* stage of consciousness is the stage of reason. Aristotle said, "Man is a rational

animal". Soul has the potential either to go down in different stages of material consciousness like plants, insects, animals or human being, or become situated in its true unmixed spiritual identity, or a serving member of the Absolute reality. All living entities, from the simplest on up, are immanently covered by the *anandamaya kosa*, the tendency of enjoyment. Only the devotee knows the proper process for establishing that fulfillment perfectly. Here he contributes by proper knowledge received from proper source [12]. The gradation presented in *upanisads* has reference to the stage of material bondage, or release and ultimately to the degree of dedication to the Absolute Center. The dedicated stage is the plane of unalloyed happiness and is characterized by grades and themes of ecstasy.

Srila Sridhar Maharaja has explained that Hegel was a very good philosopher in the West [13]. In him we can find many considerations that are useful in comprehending the Concept of Life. He is very close to Vaishnava Vedanta. The task of reason is to comprehend how the wholes are wholes. The being of the whole must be grasped as not being independent. Reality is in and for itself and not only for consciousness and reason culminates in comprehending the Whole Truth in and for itself.

## 6. Conclusion

McClintock understood through her Nobel Prize winning work on plant genetics that the living organism is a subjective being and a thoughtful being. Plants interact with the environment thoughtfully and respond to their internal necessities thoughtfully. Hegel's natural teleology explains the concept of organisms through its activity of self preservation of species, through assimilation and reproduction. Darwin's teleological explanation through natural selection is an unsubstantiated statement of the historical development of the species and stands disputed as there is no evidence. We don't want to create Frankensteins in our laboratories due to application of improper concepts to living organisms. For example honey bees are being lost as a consequence of agricultural chemicals [14]. Biology proper needs re-evaluation of its conceptual foundations to include more spiritual understanding of life. The author acknowledges his deep gratitude to his teachers Sripad Bhakti Madhava Puri Maharaja, Ph.D. and Sripad Bhaktisvarupa Damodar Maharaja, Ph.D.

## References:

- [1] <http://fcmconference.org/img/CambridgeDeclarationOnConsciousness.pdf>
- [2] Crick, F., Koch, C., A Framework for Consciousness, *Nature Neuroscience*, vol. 6, No. 2, Feb, (2003).
- [3] Sejnowski, T.J., Tesauro, G., The Hebb Rule for Synaptic Plasticity: Algorithms and Implementations, Ed. Byrne, J., Berry, W.O., *Neural Models of Plasticity*, NY: Academic Press (1989).
- [4] Wald, G., Cosmology and Mind, *Synthesis of Science and Religion: Critical essays and dialogues*, ed. Singh, T.D., The Bhaktivedanta Institute, Bombay, (1988).
- [5] Krienes, J., Kant and Hegel on Teleology and Life from the perspectives of debates about free will, *Freiheit und Gesetz series*, ed. Khurana, T., vol. 3, (2012).
- [6] Kant, I., *Kritik der Urteilskraft*. Available at: <http://gutenberg.spiegel.de/buch/3507/85>, (1790).
- [7] Kant, I., Critique of the Power of Judgment (*The Cambridge Edition of the Works of Immanuel Kant*), trans. Guyer, P., Matthews, E., (2001).
- [8] Aristotle, *de Anima*. Available at: <http://etext.lib.virginia.edu/toc/modeng/public/AriSoul.html>
- [9] Hegel, G.W.F., *The Philosophy of Spirit*, (1830).
- [10] Srila B.R. Sridhar-Dev Goswami Maharaja, Surrender to Guru, *Sri Guru and His Grace*, Sri Chaitanya Saraswat Math, Ananta Printing & Publishing, Soquel, California, (1999).
- [11] Sharma, B.N.K., *History of the Dvaita School of Vedanta and its literature.*, Motilal Banarsidass Publishers Pvt. Ltd., Delhi, 1961.
- [12] Prabhupada, A.C., Prayers by Personified Vedas, *Krishna Book*. Available at: <http://vedabase.com/en/kb/87>.
- [13] Sridhar, B.R., *Subjective Evolution of Consciousness*.
- [14] <http://topics.nytimes.com/top/news/science/topics/bees/index.html>



## 21ST CENTURY BIOLOGY

### Uncovering the Code Delusion and the Cellular Mind with No Brain

Bhakti Niskama Shanta, Ph.D.

#### Abiology, “Easy Problems” and “Hard Problem” of Consciousness

Modern science leaves no room for the subjective aspect of consciousness in its attempt to know the world in terms of relationships among forces, atoms, and molecules. This mechanistic approach created the duality between the experience and the *experiencer* – “easy problems” and the “hard problem” of consciousness.[1] The approach for “easy problems” is in line with the classical methods of scientific observation and experimentation, and hence they call this category “easy problems.” However, merely knowing the mechanistic explanations, like neurophysiological processes, functions, states, and operations that are necessary for the sense perception cannot fully elucidate another much more complex conscious realm—selfhood. The questions: “how sensations acquire characteristics, such as colors and tastes?” and “how an organism develops a sense of self?” cannot be addressed by any mechanistic explanations in abiology.

#### Code Delusion

Influenced by the grand success of computer sciences, life sciences have also adopted the concept of code in genetics and also in neuroscience to explain the sentient principles of living organisms. Following Crick’s central dogma or “genetic determinism,” many believed the idea that the secret of every sentient organism is coded in their genes (see for example, “Deciphering the code of life”[2]). However, we now know that in a living cell every genome function includes inputs and information-processing networks. Cells can rearrange their genomes—thereby writing information that influences all features of genome function. Referring several examples from studies in molecular biology and genomics, Stephen L. Talbott expertly summarized the demise of abiology in his article[3], “Getting Over the Code Delusion.” Like geneticists, neurologists also presumed that there is a “neural code”[4] that represents the mind of the organism and helps the brain to manage synaptic modulation over wide areas of cortex. However, research shows that apart from the behavior of the organism whose brain is under study, interpretations of neural action are also very much influenced by the brain states of the neuroscientists. Eggermont[5] explains this difficulty:

*“The information encoded in a train of neural action potentials is interpreted by higher order neurons and it is also interpreted by the neuroscientist who designed and*

*performed the experiments. There need not be any correspondence between these two interpretations. . . . The interpretation by the neuroscientist, however, may be influenced by the ruling paradigm in the particular field of research.”*

Information obtained from an organism’s sensory stimulation is utilized to constantly renew the brain’s internal image of the world.[6],[7] Therefore, neural codes must change with time through conscious learning, which implies that the same neural spike sequence may represent a different behavior at different times. For several such reasons, the concept that there is just one mode of neural signaling represented by a single “neural code” is certainly false. Recently, Erlich[8] stated:

*“Extensive investigation of the brain’s synaptic connectivity, the presumed material basis of cognition, has failed to explain how the brain thinks. Further, the neural code that purportedly allows the brain to coordinate synaptic modulation over wide areas of cortex has yet to be found and may not exist.”*

#### Cellular Sentience- Mind with No Brain

After René Descartes (known for encouraging mistreatment of animals[9]), many furthered the misconception—that only humans are conscious and that no animals are conscious. Recently, several prominent scientists signed the Cambridge declaration at the First Annual Francis Crick Memorial Conference, stating, “. . . the weight of evidence indicates that humans are not unique in possessing the neurological substrates that generate consciousness. Nonhuman animals, including all mammals and birds, and many other creatures, including octopuses, also possess these neurological substrates.”[10] However, the statement unfortunately perpetuates further misunderstandings, that, “neurological substrates . . . generate consciousness”. Scientists and philosophers following the concept of “identity theory” believe that the brain secretes thought like the liver secretes bile.[11],[12] Disproving all that, twenty-first century biology shows that even the smallest cells (brainless) are also conscious entities.[13]

#### 1. Cellular Sentience from the Perspective of Organismal Behavior

Cognitive studies on organismal behavior have been done for the cases of many unicellular organisms such

as bacteria, protozoa[14], amoeba[15], unicellular algae (cyanobacteria)[16] and unicellular fungi (slime mold)[17], and archaea[18]. Many biologists still believe that Darwinian competition is the prime feature of life. However, this is contradictory. Cooperation is the very nature of all living organisms.[19] Humans, colonial insects, like ants and bees and even microorganisms (including bacteria) display cooperation.[20] Monod's pioneering studies revealed how *E. Coli* chooses the best sugar to eat.[21] Quorum sensing is the language that bacteria utilize to communicate important information and coordinate bacterial populations into supracellular colonies.[22] Apart from bacteria, green algae use cognitive photo-induced intracellular electric signals and their motor flagella in eye-apparatus.[23] In an experimental setup, amoeba can answer geometric problems.[24] Unicellular organisms display learning, memory, anticipation, risk management, and other aspects of cognitive behavior.[25]

Not only unicellular organisms can perform these functions, but also the individual cells in the multicellular organisms also exhibit individual cognitive behavior. Gametes of multicellular living entities display sentient cell-cell communication and chemotaxis.[26] Sperm cells and oocytes use several cognitive transmitters.[27] Plant cells and neurons in other multicellular organisms produce sentient action potentials.[28] Root cells of plants exhibit sentient features at the transition zone interpolated between the apical meristem and elongation region.[29]

## ***2. Cellular Sentience from the Perspective of Cell Functions***

Cells can cognitively read their environment, analyze the received information and then execute the necessary action to continue their survival.[30] This coordinated cell action is known as cell signaling, and also substantiates that cell also has a mind. A living cell regulates practically every cell function, including DNA synthesis, RNA synthesis, protein synthesis, cell division, cell differentiation, morphogenesis, and neuroendocrine regulation.[31] A cell cognitively monitors different cellular processes, and if there is either a mistake or damage, a cell can detect the problem. A cell activates a checkpoint and stops the entire cycle until all has been set accurately to further progress the cycle.[32] Cells execute programmed cell death where they perform suicide by following an organized cascade of events, known as apoptosis.[33] To coordinate functions in cell communities, cells use integration-receptors which respond to information signals. In different environments, using intercellular signaling molecules, cells can select and execute various essential actions.[34] Identity receptors are also known as self-receptors, or histocompatibility-

receptors, and they help cells to have individual and collective identity.[35] Therefore, they help cellular communities to collectively respond to a central command—and are used by the immune system in the multicellular organisms to discriminate self from invader. Self-receptors also play an important role in the functioning of organs or tissues. If our tissues and organs recognize a requirement for protection, they can compromise their growth activities. Completely dismissing central-dogma, cells can rewrite existing gene programs in an attempt to surmount stressful conditions.[36] All such evidence clearly acknowledges that all living cells are also individual cognitive entities.

## **Conclusions**

Scientists consider the cell nucleus (because DNA and genes are within the cell nucleus) as an equivalent to the brain of a cell. By considering brain as the source of consciousness, it was believed that if the brain is detached from any organism, the instantaneous and indispensable outcome of that action is the organism's death. However, for over forty years, research in medical science has proven this wrong. In 1970, Robert White and his team successfully transferred the head of a rhesus monkey to the headless body of another monkey. The monkey survived for eight days.[37] Researchers are also attempting to perform the same scenario with human beings.[38] Cells are found to be more robust towards brain removal than multicellular organisms. It has been reported that enucleated cells continue to survive and display a regulated control of their biological processes for up to three months.[39] Therefore, for both single-cell and also multicellular organisms, the brain is *not* the source of life.

*Srimad Bhagavad-Gita* explains that consciousness is the symptom of the existence of the soul; the soul of each individual living entity is eternal and therefore has no material basis. We have shown in this article that empirical evidence in twenty-first century biology substantiates that life requires cognition at all levels. Moreover, we have also seen that the source of our consciousness – soul is beyond the interaction of neurons in our brain. This further ascertains that there is no part in the body of a living organism which we can call as the source of our consciousness and therefore soul is a non-material entity. Modern science was dominated by atheistic presumptions and therefore it was a general practice to dismiss the concept of soul as an object of religious belief. However, revolutionary twenty-first biology and its new understandings of consciousness have thoroughly challenged this

unscientific attitude. This is an abridged version and full article can be found [here](#).

## References

1. Harnad, S. (1995). Why and how we are not zombies. *Journal of Consciousness Studies*, Vol. 1, pp. 164-167.
2. Collins, F.S. and Jegalian, K. G. (1999). Deciphering the code of life. *Sci Am*, Vol. 281, pp. 86-91.
3. Talbott, S. L. (2010). Getting over the code delusion. Summer Issue of *The New Atlantis*: [www.thenewatlantis.com/publications/getting-over-the-code-delusion](http://www.thenewatlantis.com/publications/getting-over-the-code-delusion)
4. Bialek, W., Rieke, F., de Ruyter van Steveninck, R. R. and Warland, D. (1991). Reading a neural code. *Science*, Vol. 252, pp. 1854-1857.
5. Eggermont, J.J. (1998). Is there a neural code? *Neuroscience & Biobehavioral Reviews*, Vol. 22, pp. 355-370.
6. Eichenbaum, H. and Cohen, N. J. (1998). Representation in the hippocampus: what do hippocampal neurons code? *Trends in Neurosciences*, Volume. 11, pp. 244-248.
7. Zhang, K. (1996). Representation of spatial orientation by the intrinsic dynamics of the head-direction cell ensemble: A theory. *Journal of Neuroscience*, Vol. 16, pp. 2112-2126.
8. Erlich, V. M. (2011). Cognition without a neural code: How a folded cortex might think by harmonizing its own electromagnetic fields. *Einstein Journal of Biology & Medicine*, Vol. 27(1), pp. 34-47.
9. Carruthers, P. (1999). Sympathy and subjectivity, *Australasian Journal of Philosophy*, Vol. 77, pp. 465-482.
10. The Cambridge Declaration on Consciousness in Non-Human animals was publicly proclaimed in Cambridge, UK, on July 7, 2012, at the conclusion of The First Annual Francis Crick Memorial Conference, focusing on "Consciousness in Humans and Non-Human Animals", at Churchill College, University of Cambridge, by Philip Low, David Edelman and Christof Koch. It was written by Philip Low and edited by Jaak Panksepp, Diana Reiss, David Edelman, Bruno Van Swinderen, Philip Low, and Christof Koch. The Declaration was signed by the conference participants that very evening, in the presence of Stephen Hawking, in the Balfour Room at the Hotel du Vin in Cambridge, UK. Reference: <http://femconference.org>
11. Feigl, H. (1958). The mental and the physical. In *Concepts, Theories and the mind-body problem*, Ed. Feigl, H., Scriven, M. and Maxwell, G., Eds. *Minnesota studies in the philosophy of science*, Volume 2, Minneapolis: University of Minnesota Press; reprinted with a Postscript in Feigl 1967.
12. Place, U. T. (1956). Is Consciousness a Brain Process? *British Journal of Psychology*, Vol. 47, pp. 44-50.
13. Shapiro, J. A. (2007). Bacteria are small but not stupid: Cognition, natural genetic engineering and socio-bacteriology. *Stud. Hist. Phil. Biol. & Biomed. Sci.*, Vol. 38, pp. 807-819.
14. Greenspan, R. J. (2007). *An introduction to nervous systems*. Cold Spring Harbor Laboratory Press.
15. Saigusa, T., Tero, A., Nakagaki, T., Kuramoto, Y. (2008). Amoebae anticipate periodic events. *Phys Rev Lett.*, Vol. 100, 018101.
16. Sheredos, B. (2012). Reductio ad bacterium: The ubiquity of Bayesian 'brains' and the goals of cognitive science. *Frontiers in Psychology*, Vol. 3, Article 498.
17. Nakagaki, T. (2001). Smart behavior of true slime mold in a labyrinth. *Res Microbiol.*, Vol. 152, pp. 767-770.
18. Ruhr-Universitaet-Bochum (2013, June 10). How Archaea might find their food: Sensor protein characterized. *ScienceDaily*. [www.sciencedaily.com/releases/2013/06/130610095030.htm](http://www.sciencedaily.com/releases/2013/06/130610095030.htm) (Retrieved August 17, 2013)

19. Sachs, J. L. (2006). Cooperation within and among species. *Journal of Evolutionary Biology*, Vol. 19, p. 1415.
20. Brockhurst, M. A., Hochberg, M. E., Bell, T. and Buckling, A. (2006). Character displacement promotes cooperation in bacterial biofilms. *Current Biology*, Vol. 16, pp. 2030–2034.
21. Monod, J. (1966). From enzymatic adaptation to allosteric transitions. *Science*, Vol. 154, pp. 475-483.
22. Waters, C. M., Bassler, B. L. (2005). Quorum sensing: cell-to-cell communication in bacteria. *Annu Rev Cell Dev Biol.*, Vol. 21, pp. 319-46.
23. Kateriya, S., Nagel, G., Bamberg, E. and Hegemann, P. (2004). Vision in single-celled algae. *News Physiol Sci.*, Vol. 19, pp. 133-137.
24. Nakagaki, T., Iima, M., Ueda, T., Nishiura, Y., Saigusa, T., Tero, A., Kobayashi, R. and Showalter, K. (2007). Minimum-risk path finding by an adaptive amoebal network. *Phys Rev Lett.*, Vol. 99, 068104.
25. Baluška, F. and Mancuso, S. (2009). Deep evolutionary origins of neurobiology. *Communicative & Integrative Biology*, Vol. 2:1, pp. 60-65.
26. Hu, J. H., Yang, N., Ma, Y. H., Jiang, J., Zhang, J. F., Fei, J. and Guo, L. H. (2004). Identification of glutamate receptors and transporters in mouse and human sperm. *J Andr.*, Vol. 25, pp. 140-146.
27. Bray, C., Son, J. H., Kumar, P. and Meizel, S. (2005). Mice deficient in CHRNA7, a subunit of the nicotinic acetylcholine receptor, produce sperm with impaired motility. *Biol Repr.*, Vol. 73, pp. 807-814.
28. Fromm, J. and Lautner, S. (2007). Electrical signals and their physiological significance in plants. *Plant Cell Environ.*, Vol. 30, pp. 249-257.
29. Baluška, F., Mancuso, S., Volkmann, D. and Barlow, P. W. (2004). Root apices as plant command centres: the unique brain-like status of the root apex transition zone. *Biologia*, Vol. 59, pp. 9-14.
30. Brandman, O., Ferrell, J. E., Li, R. and Meyer, T. (2005). Interlinked fast and slow positive feedback loops drive reliable cell decisions. *Science*, Vol. 310, pp. 496-498.
31. Hartwell, L. H. (1991). Twenty-five years of cell cycle genetics. *Genetics*, Vol. 129, pp. 975-80. Also refer: [http://www.sabiosciences.com/pathway.php?sn=Cyclins\\_Cell\\_Cycle\\_Regulation](http://www.sabiosciences.com/pathway.php?sn=Cyclins_Cell_Cycle_Regulation)
32. McAdams, H. H. and Shapiro, L. (2009). System-level design of bacterial cell cycle control. *FEBS Lett.*, Vol. 583, pp. 3984-3991.
33. Bursch, W. (2001). The autophagosomal-lysosomal compartment in programmed cell death. *Cell Death and Differentiation*, Vol. 8, pp. 569-581.
34. Lane, N. (2008). Marine microbiology: origins of death. *Nature*, Vol. 453, pp. 583-585.
35. Langman, R. E. (1978). Cell-mediated immunity and the major histocompatibility complex. *Reviews of Physiology, Biochemistry and Pharmacology*, Volume. 81, pp. 1-37.
36. Bandyopadhyay, et al. (2010). Rewiring of genetic networks in response to DNA damage, *Science*, Vol. 330, pp. 1385-1389.
37. White, R. J., Wolin, L.R., Massopust, L.C. Jr., Taslitz, N. and Verdura, J. (1971). Primate cephalic transplantation: neurogenic separation, vascular association. *Transplant Proc.*, Vol. 3, pp. 602-604.
38. Canavero, S. (2013). Heaven: The head anastomosis venture Project outline for the first human head transplantation with spinal linkage (GEMINI). *Surgical Neurology International*, Vol. 4, pp. S335-S342.
39. Chapman, C. J., Nugent, N. A. and Schreiber, R. W. (1966). Nucleic acid synthesis in the chloroplasts of acetabularia mediterranea. *Plant Physiol.*, Vol. 41, pp. 589-592.

# WHY IS GOD NEEDED TO ACCOUNT FOR THE UNIVERSE?

**Rsiraja Das, M.Sc.**

One of the key ideas of modern science is that the world is built out of matter of one kind – substantial, objective and extended in physical space-time. This matter is further governed by mathematical laws of ‘force’ that govern the spatial-temporal evolution of objects comprised of matter. And this idea has been very successful in building many kinds of technologies.

The important question at this time is: can everything be explained in terms of substantial, objective and spatial-temporally extended matter? Evidently, the scope of science has been growing. Things that were outside the explanatory powers a few centuries ago are well within reach today. Can this not mean that we must continue extending what we already know, and that all things would ultimately be explained using concepts similar to what we have today? There are two ways to answer this question. The first is to merely take each problem and try to theorize it in terms of what we know and see if it can be explained in terms of what we know. If we could not, then we would have to expand our conceptual framework to incorporate new kinds of material ontologies. This is how science works. The second is to consider the kinds of ontologies that we are familiar with in everyday experience and determine if some of these ontologies are in fact reducible to others. The present article will investigate this second approach. What kinds of ontologies are there and can they be reduced to each other? Different ontologies also define the domains of experience in which they can be observed, so this is not contrary to the first approach, although more shorthand for our present discussions.

In our everyday experience, we employ several ontological modes that go beyond objective thing-like matter, such as: functions, processes, operations and actions, as well as subjective categories such as sensations, emotions, cognitions, pleasure and meaning. A trend in early 20th century philosophy called positivism, tried and failed to reduce concepts to sensations. However, the dominant approach today is to try and reduce all forms of ontologies in ordinary language to just one – namely that of objective and extended matter. But, if there is nothing other than extended matter then a living being is compositionally not different from a stone (note that living beings are different structurally and functionally, but structure and function are still everyday concepts and not scientific concepts). How are living beings then intelligent, conscious and experience sensations and emotions? What are intelligence, sensation and emotion? These questions are not answered today. However, there is a tendency to think that these would ultimately be explained in terms of current material ontologies. Why?

Imagine that we are trying to explain why a certain perfume has a specific, peculiar smell. We could do a spectroscopic analysis of the perfume and identify the molecular structure of the constituents that comprise the perfume. We could then

determine that other perfumes with similar molecular structure have a similar smell, or that certain peculiarities of the molecular structure give the molecule certain kinds of smell. By this analysis we could map the molecular structures to sensations of smell. And a scientist can now claim that he has indeed explained the sensation of smell. But, has he? There could be other individuals or species that do not sense the perfume in the same way. There could also be differences in the sensations of a single individual at different times and places. However, even apart from all of these, sensations themselves are ontologically distinct from the molecular correlates that create them. The tendency today is strong to believe that if a molecule creates a sensation, then the sensation must also be molecular. This is the belief that like causes like, and if molecules can cause sensations, then the two must be alike. In this case, since we have determined that the perfume is a molecule, we must now conclude that the sensation of smell must also be molecular. It then follows that the entire world because it interacts in some way or another with molecules must be molecules. And if it is not like molecules then it cannot interact with the molecular world and hence it cannot be relevant to our knowledge about the world. Indeed, because our bodies are molecular, a non-molecular reality cannot even exist because if it did then how would it connect with the realm of molecules?

I have just paraphrased the famous mind-body problem in which living beings seem to have both mind and body but wherever the mind interacts with the body, it becomes the body and so there cannot be two entities – mind and body. We must rather construe only one entity – the body – and attempt to explain the mind from that.

The question is however not unique to minds and bodies, but a generic consideration about different kinds of ontologies. If there are indeed distinct kinds of ontologies, then we must construe a framework of causality in which these distinct ontologies can co-exist and interact and mutually influence each other. Unless we can construe this framework, we would be forced to reduce all kinds of ontologies to just one kind with the consequence that we would actually fail to explain the nature of sensations, emotions and cognitions different from molecules.

Such a scheme of construing multiple ontologies is available in the Vedic philosophy that describes multiple kinds of realities. Notably, however, unlike the current construal of ‘mind’ and ‘body’ which Descartes thought were two kinds of substances, multiple realities are not of the same kind, namely, these are not substances. Different kinds of realities are distinct in the sense that an object is distinct from a process or in the sense that reason is different from sensation. These multiple kinds of realities are thus graded in levels or hierarchies employing a consideration about how ‘subtle’ or ‘gross’ a level of reality is. The grossest reality is that which is being considered by science today. This is comprised of

matter that can be seen, touched, tasted and smelled. The Vedas describe that there are several levels of reality that are deeper or subtler than this matter. The subtler levels include realms of objective reality such as structure, function and intent. Thus for example, when we study objects in the world, we should know them not just by their atomic constitution, but also how these atoms are structurally organized, how these structural organizations are functionally used and how we view an object in our intentions. Atoms, structures, functions and intents are distinct and yet objective levels of reality. These levels are related not causally in the sense that causality is construed today, in which like influences like through laws of force. Rather, the different levels of reality are related to each other as meta-informational levels. Thus, structures are meta-organizations of atoms. Functions are meta-organizations of structures. And intents are meta-organizations of functions.

One only needs to think of an everyday organization to understand this hierarchy. Every organization is formed with some intent or purpose, such as the intent to make money or with the intent to disseminate knowledge in a particular field. This intent is gradually developed into a functional hierarchy, involving different roles such as management, engineering, sales, marketing, communication, finance etc. Each of these functions gradually evolves into a structure requiring superior, subordinate and peer relations and each structure is in turn populated using individual entities. The individual entities are objects, but these objects are organized structurally, functionally and intentionally. Each of these levels of reality is consistent in itself and can be studied in itself. However, each of these levels is incomplete without the others. An object is not completely known by just knowing the properties it possess. Rather it is properly known only when we know how to relate it to other objects in the structures of which it is part, how it is used to perform functions and how we view it through our intentions. In other words, new properties emerge when an object combines with others in structural, functional and intentional relations. Similarly, intents are incomplete unless they are realized in functions, structures and objects.

The various levels of descriptions of an object are not causally connected, but they are connected as levels of meta-information. If the intent of an organization is changed, then automatically its function, structure and objective constitution must also change. Similarly, if an organization is built out of unwanted objects, organized in incorrect structures and performing erroneous functions, these would not meet the intents of the organization. Changing the objective constitution changes the structures, functions and intents, not through forces but through levels of meta-information. That is quite like saying that if we changed the order of chapters in a book, we would also change the table of contents in the beginning and index at the end. The table of contents and index are meta-information about the book.

Apart from different objective categories, Vedic descriptions also include a number of subjective categories such as memories of rules and regulations, memories of procedures by which we do things, episodic and conceptual memories and memories of individual tastes. They also include categories such as the meaning of life, sensation, pleasure and the experience of activity. While Western philosophy broadly

classifies the world along subjective and objective dimensions, implying that these are only two aspects in the world, Vedic philosophy dwells deeply into distinguishing between various aspects of the 'objective' and 'subjective' spheres.

Think of an ordinary term such as a 'table'. What are the things that this term can denote? The term can mean a collection of atoms and molecules. It can also mean a certain kind of structure that transcends whether the table is made out of plastic or wood (different kinds of molecules). It can mean a certain way in which we use objects functionally, which transcends various kinds of structures (functionally useful tables can be square or circular). The term can also mean how we view certain things (transcending a particular functional use), so I can see a 'chair' as a 'table' and use it as such, even though others might not see it in that way. All these denotations are in the objective realm. In the subjective realm, the term 'table' can mean certain kinds of sensations of color, shape, size and weight. It can mean a certain perceptual wholeness of experience by which we cognize something as a complete object of a certain kind. It can also denote a certain kind of emotion that some object generates in me when I cognize it. Objects in the world can give rise to pleasure in us, and the meaning of the term can then be the pleasure it invokes in us. 'Table' can also mean the act of consciously experiencing something in a certain way. Finally, objects in the world give a meaning to our life and so we can say that this particular table 'means' a lot to me. We can debate endlessly about which of these uses of the term 'meaning' is the 'real' meaning, but the fact is that we use meaning in all these ways. Each of these uses is distinct in its flair and it corresponds to a different aspect of experience. The Vedic theory accounts for everyday experience, so it must account for all aspects of meaning of a particular term, no matter what that term is. The Vedic theory of creation is based upon this multi-dimensional construal of meaning.

In the Vedic view, the first thing to be created in the universe is 'sound' or symbols. Such symbols are akin to the symbol 'table'. As symbols, they are meaningless and in fact at this stage of creation, meanings don't exist. This is called in Vedic parlance *sabda-brahman* and can be likened to the Biblical aphorism 'in the beginning was the word'. As creation proceeds, the symbols are divided into various kinds of meanings, both objective and subjective. The stage of the universe in which the meanings are manifest is called *artha-brahman*. The division of a 'word' into multiple 'meanings' follows the act of interpretation of a word into multiple different dimensions. This interpretation is done by consciousness and so consciousness is necessary for meaning to develop out of symbols. However, this consciousness is not ordinary consciousness. It is rather the consciousness of God. The act of interpretation of a word into meanings is sometimes called the 'glance' of God over a symbolic reality — *Pradhana* which is a reflection of God's existence in matter (the Vedas also describe this as Brahman appearing to be 'covered' by matter). By this glance, God divides a unified symbol into many distinct meanings or experienceable categories. The various dimensions or ways in which a word can be interpreted are the ones briefly described above. So, a 'word' has not just objective meanings, as Western philosophy has largely thought up until this point, but various kinds of

subjective meanings as well. The various objective and subjective meanings are however not arbitrary. There is instead a definite organization, form and inter-relation between the various kinds of meanings. These relations are various kinds of meta-informational relations between meanings. By these relations, we can say that such and such sensation corresponds to such and such structure or atomic constitution in the world. However, by establishing this relation, we are invoking a relation between various kinds of information and not reducing one to another.

Science has thus far considered only one kind of information – namely, atomic reality and there are multiple issues in this construal, because we treat this reality not as one kind of meaning but as some kind of thing. Moving to a semantic construal of atomic reality requires us to reinterpret our fundamental physical theories. However, even after we do that, we would still be left with only one kind of meaning of all words – the objective meaning. Since a word can have many kinds of meanings, newer kinds of corresponding realities must be invoked to account for each one of these kinds of meanings. A complete set of kinds of meanings would include all possible interpretations of a word. While Western philosophy has construed meaning in a restrictive way, in the Vedic view, meaning is definite not because there is only one kind of meaning but because there is a definite structure and interrelation between various kinds of meaning. Science must therefore grow from one kind of meaning to multiple kinds of meanings.

This brings us to the central point of this article, which is to ask: why do we need God to account for the universe? This question has a scientific counterpart and can be scientifically posed as follows: why is the structure of meaning relations the way it is? Why is there a fixed set of possible interpretations of a symbol? Why should a term be divided into meanings in only a certain definite way? Why is the conscious structure of meaning cognition the way it is? We can know through science that our meaning cognition has a certain structure, that a word has certain definite kinds of meanings, but how do we explain that these are the only definite meanings of a word? Why is it that we can interpret a word only in these definite ways and no more?

It is evident that there cannot be any answer to this question from within science or from within the material world. The Vedas offer an answer to this question, but that answer lies outside science and outside the material creation. The answer is that the form of our meaning cognition has its root in the way God interprets the symbolic reality. This way in turn depends upon what God is.

In the Vedic description, God has many aspects, and when God interprets the material reality He interprets it according to the ways in which He wants to know His Self. This is because the act of creation is the act of self-actualization for God, by which God externalizes His personality for the sake of His knowledge. Obviously, then, the ways in which He externalizes Himself is the way in which He desires to know Himself. This desire to know Himself is further dependant upon what He actually is, to make this His true self-

actualization. His acts of interpretation then result in the creation of His 'reflection' in the material creation as different kinds of meanings. God wants to know Himself as His name, form, qualities, activities and paraphernalia. Each of these aspects leads to a different kind of meaning in the creation, which become different kinds of ontological categories in the creation.

When there is only one ontological category, we might assert that that category is the whole and sole reality. But, when there are many distinct ontological categories, then there is need to search for either (1) the 'original' ontological category or (2) a category beyond these categories. In the Vedas, the original category is God whose many aspects create different ontological categories in the universe. Science can help us understand the several ontological categories and their interrelations, but not why there are only such and such categories and not any other. This can come only from an appreciation of the creator in whose image the creation is manifested. God alone is the integration of all these aspects and therefore if we have to understand why our meaning cognition takes a certain form, we must begin to see God's persona through this form of meaning cognition. A person who has developed such a vision sees nothing 'other than' God, because he is seeing how everything is ultimately related to some or other aspect of God's persona as a reflection of His personality in the creation. However, in order to relate everything to God, we must first recognize the different ontological categories that exist in the world. We must then conceive an appropriate kind of God to whom each of these ontologies can be mapped in a one-to-one fashion. It is only when these two steps have been performed, that new kinds of mystical experiences can arise. The first step is purely scientific and the second step is religious, but theoretical. The mystical aspect is a development of a scientific understanding of matter, a theoretical understanding of the relation of matter to God and a practical application of this relation in everyday experience.

God is necessary to account for the creation because it is He alone that provides the unity in the different kinds of meanings of a single term. He is in a sense the unity in the diversity of the universe. Science can give us the diversity and the relations between these diversities but not the underlying unity. A conception of God is necessary in addition.

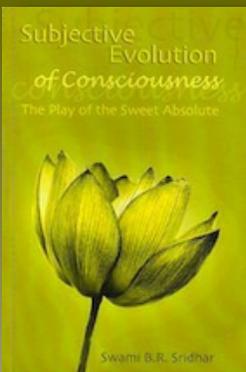
The creation begins with 'sound' also called *śabda* from which all kinds of realities emanate. This *śabda* is *OM* and this sound is a symbolic representation of God. This brings in more parallels with the Biblical statement that 'in the beginning was word, and the word was God'. The 'word' at the beginning is actually 'OM' and this sound is a representation of God. From this word, many different kinds of words emanate, beginning with the division of 'OM' into 'A', 'U' and 'M', a sequence that is verily described in *Tantra* literatures.

Now, this sometimes leads to an impersonalist view of God in which a unified existence leads to diversity and therefore ultimately the diversity must be false. So, the impersonalist claims that if *OM* is unified and this leads to diversity, then we must discard the diversity of the world to attain the unity. The impersonalist is not wrong, but he only has a partial truth. The division of *OM* into letters and words is merely in the domain of *sabda-brahman* (literally the word—God); *artha-brahman* (the meaning—God) has not yet been created. The universe at this stage of creation is words without meanings. This is because the conversion of word into meaning requires an act of interpretation by consciousness. The ways in which this interpretation is possible makes up the form of our cognitions and this form ultimately comes from God. Basically, the way in which we are seeing the world and experiencing the meaning is ultimately due the way in which He personally interprets reality. The fact that our experiences comprise of sensation, perception of objectivity, emotion, pleasure, perception of activity etc. is because these categories of meaning emanate from God. Thus it is said that ‘man is made after God’s image’. This should not be taken to mean that God suffers or enjoys the way we do, but rather that the form of cognition in us is identical to the form of God’s cognitions. We have objective matter, sensations, emotions, pleasure and activity because these are the ways in which God interpreted a unified sound to create variegated meanings.

There are therefore two kinds of diversities that arise from a singular unity. The first is created from the unity of *OM* by which a variety of symbols are generated. The second is created from God’s persona by which all kinds of possible interpretations of a symbol are created. Knowing the unity behind the various symbols is knowing God as a single being,

also called Brahman or just *sabda-brahman*. However, knowing the structure of cognition or the ways in which the words are interpreted into meanings is knowing God as *Bhagavan*, *artha-brahman* or a person. Both forms of knowledge are essential, one impersonal and the other personal. The impersonal existence is the general, undifferentiated ‘being’ and the personal is the individual, differentiated ‘interpretation’ or meaning. Both kinds of existences form the basis for the origin of the universe, and yet they transcend it. If we have to know the unity underlying the diversity then, we need to know the source, God, from whose sound representation and from whose personality the creation proceeds.

In present science, the unity of the creation is laws of nature and the sub-atomic particles of atomic theory. But, this unity is partial because we have currently not considered theories about all possible meanings of a term. Today, when we speak of a ‘table’ we just mean atoms and molecules. When we will add to this repository of meanings different other interpretations of the word ‘table’ as described above, then we would find the need to conceptualize the unity underlying this new kind of diversity that currently does not exist. Today because there is only one kind of meaning, there is no need to think of a unifying agent and the single material reality and the laws governing that reality appear to be ultimate. This is only because science hasn't yet progressed enough to incorporate theories about other kinds of ontologies. The addition of other meanings requires us to consider other aspects of our ordinary experience and incorporate them into scientific theories. A logically orthogonal set of meanings and their interrelations are available from Vedic literature. A better appreciation of these meanings can help us formulate better scientific theories which will advance the purposes of a religious understanding as well.



## Subjective Evolution of Consciousness

**Evolution is generally thought of as something merely objective. But objective evolution is a misperception of reality. Evolution is actually based on consciousness, which is subjective. Subjective evolution, however, seems to be objective evolution to those who are ignorant of this perspective. Consciousness seems to be the unessential embedded in a concrete substance, but actually it is just the opposite. Consciousness is the substantial and its objective content or world is floating on it connected by a shadowy medium like mind. This view finds surprising support in advanced modern science from which physicists like Paul Davies have concluded**

**that it is necessary to adopt “a new way of thinking that is in closer accord with mysticism than materialism.”**

**The dynamic super-subjective living reality that produces as much as is produced by its constituent subjective and objective fragmental parts or moments is in and for itself the embodiment of ecstasy, that is forever beyond the static reification of materialistic misunderstanding. With an irresistible passion for truth, Srila Bhakti Raksak Sridhar Dev-Goswami Maharaja, the author of *Subjective Evolution of Consciousness* takes us to an incomparable synthesis of thought from Descartes, Berkeley and Hegel in the West to Buddha, Shankara, and Sri Chaitanya in the East to reveal the ultimate conception of reality in all its comprehensive beauty and fulfillment.**

**To obtain a copy of the book *Subjective Evolution of Consciousness* please contact us at:  
editors@scienceandscientist.org**