**3. Jainism on Modern Issues**

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**Engaging Jainism with Scientific Research**

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**ABSTRACT**

Every era has its specific problems for which solutions are sought either from religion or from science. Scientific discoveries and technology today is thought to provide solutions to many of these problems. For example, presently we have severe environmental problems like pollution, Green House effect, rapid and unsustainable development, shortage of water, consumerism, socioeconomic disparity, terrorism etc. Jainism, if its principles of five *anuvratas* and life style are followed, offers effective solutions to all these problems. But instead of practicing Jain way of life, people prefer that these be solved by scientific techniques, realizing little that while providing solutions to these problems, science will create many other undesirable side effects and new, more complicated problems will arise. But this is the way this cycle has been going on for several hundred years. It is to the credit of scientific research, that many chronic problems of health, involving diseases and short life span, human misery in terms of physical work, etc. have been successfully tackled by science. In this paper we explore the possibility whether Jain wisdom can engage with science or can indeed lead scientific research and both together can be used in the 21st century for expanding our horizons and for physical and mental benefit of humanity.

Science today stands at cross roads where many renowned scientists believe that scientific methodology, i.e. study of the objective world, has severe limitations. What happens when the object of study is the subject itself? Is the knowledge of an object or subject complete without its context? Objective science can only explain the material world and cannot explain personal experiences, Qualia, consciousness, omniscience, rebirth, ESP and similar phenomena. Jainism, on the other hand, can explain all these phenomena with its philosophy based on the existence of soul (*Atma*) and a conscious field pervading the whole universe. The fact that many scientific concepts, principles, laws and phenomena discovered by scientific techniques, theory and logic were already mentioned in Agamas, documented one to two millennia ago, give credence to the fact that Jain philosophy is strongly rooted in science and vice versa. Several such examples will be enumerated.

Some of the recent topics of scientific research, related to consciousness and the characteristics of the universe will be discussed and the power of combining science and Jain philosophy in further understanding the living and non-living processes will be discussed. Integrating the available information, an attempt will be made to present a coherent model.

1. **INTRODUCTION**

Jain philosophy has been built upon some scientific concepts and principles. For one thing, every phenomenon involving living and non-living is based on certain laws. There are no *ad hoc* assumptions, like Omnipotent God, the creator, who can do anything. Thus there is no scope for miracles or favour or fear of God. The Jain scriptures or Agamas, containing the knowledge propounded by the last Tirthankar Mahavira, about 2600 years ago and documented later, during the first millennium of Christian era, contain many propositions recently discovered by modern science during the past century or two. Some of these concepts may go back at least several thousand years, to the time of the First Tirthankar Rishabh Deva. Thus Jain philosophy, having one of the *Mahavrats* as search for Truth, not only take a scientific approach towards the universe, but mentions many concepts, facts and theories, which remained elusive to science till recently.

We first discuss some of these concepts, just to lay the scientific foundation of Jain philosophy and then argue that now the time is ripe when the potential of Jainism can show the way for carrying forward scientific research in future. The reason for this assertion is that physics only deals with material or inanimate world whereas Jainism deals with both, the animate and the inanimate. Thus science is incomplete in the sense that it ignores many important aspects such as soul, consciousness and experience.

It is impossible to list all the scientific aspects of Agamas, firstly because Agamas need to be properly reinterpreted in the light of scientific knowledge in a logical framework and secondly, because the list is long. We will be selective in the following discussions and they are only illustrative of the scientific treasure in the Agamas. Table 1 summarizes few facts mentioned in the Agamas which science has discovered only recently, say within the last few centuries. We discuss them briefly under three categories: discoveries, concepts and laws.

Table 1. Some scientific concepts from Agamas, rediscovered by scientific studies recently

* Life in plants: J.C. Bose (1926): Mechanism of plants
* Micro-organisms in Water, air and soil: Zachharia Janssen: 1590 AD
* Law of conservation: nothing can be created from nothing: eternal

 existence

* Causality: cause and effect: *Karmavada*
* Determinism:*Krambaddhaparyaya*
* Entanglement: *Parasparopagraho jivanam*
* concept of Indescribability
* Newton’s first law
* Smallest units of space (*pradesha*), time (*kalanu*, *samaya*) and soul

(*atmapradesha*)

* Dimensionless *paramanu* and its motion
* Bose statistics: one to infinite *paramanus* can occupy one space unit
* Shells around celestial bodies
* Climatic cycles 21000 years and 41000 years etc.
* Black holes: *Krishnaraji* and *Tamaskaya*
* Mathematical series,
* Large numbers
* Concept of various types of infinities
* Decimal system
* Permutation etc.

**1.1 Discoveries**

* Life in plants: The western civilization and scientists did not believe that plants have life. Influenced by thinkers like Descartes, the western thought did not even consider that, except humans, the lower animals, have souls or are living. Plants are living entities is clearly written in Agamas and form a core component for observance of non-violence in Jain life style. Jains do not walk on greenery, do not pluck flowers and fruits and do not eat green vegetables etc. to the extent possible. The fact that plants have life and emotions was experimentally demonstrated by a set of experiments by J.C. Bose and published in his book 'Mechanism of plants' only in 1926.
* Micro-organisms in Water, air and soil: Jainism postulated that earth, water, fire, air and soil contain microorganisms, invisible to the eye, more than 2600 years ago. Scientific proof of such microorganisms came only after Zachharia Janssen and his father in 1590 CE invented a microscope with which microorganisms could be seen.
* Shells around celestial bodies: Mention of Valaya or shells around planetary bodies is mentioned in Bhagvati Sutra compiled during the early part of Christian era. In contrast, scientific discoveries of shells (e.g. Magnetosphere, Ionosphere, Atmosphere around the Earth) and other planets were made only after 1950's after the advent of space age when satellites were sent in space around Earth and other planets.
* Climatic cycles 21000 years and 41000 years: *Kaalchakra* or Cosmic wheel of time, described in Jain Agamas clearly mentions six *Aras*each in *Avasarpini* and *Utsarpini* half cycles, the last two of which (Vth & VIth *Ara*) have a period of 21000 years each. R.M. Jain (2011), N. Bhandari (2011), and Jain and Bhandari (2017) have argued that these are actually climatic cycles of Earth due to changes in tilt angle, ellipticity and eccentricity of Earth's orbit, as proposed by Milankovitch, known as Milankovitch cycles and confirmed experimentally by temperature cycles discovered in deep sea sediment cores. The quantitative agreement of the 21000 year cycle, mentioned in Agamas and determined by measuring oxygen isotopic composition is amazing.
* *Paramanu* and its motion:

Jainism propounds that *paramanu* is the smallest material entity. It is dimensionless and indivisible, and although it undergoes several types of transformations, motions and vibrations, its behaviour depends on various conditions.

The Bhagavatisutra vividly describes types of motions a *paramanu* undergoes when it mentions that "Under certain conditions a *paramanu* undergoes simple vibrations, complex vibrations, motion, oscillations, collisions, penetration and excitation, that is, it undergoes varied transformations; under other conditions, it does not undergo simple vibrations, complex vibrations, motions, oscillations, collisions, penetration and excitation, that is, it does not undergo varied transformations."

Scientifically, according to the currently accepted 'Standard theory' of particle physics, three groups of particles constitute all matter: leptons (e.g. electrons, neutrinos and mesons), Quarks of which protons, neutrons etc. are made of and carrier particles of various forces (e.g. photons for electromagnetic force, gluons for strong interactions and W and Z bosons for weak nuclear force and Higgs Boson). These are the basic constituents of matter so far discovered, besides the graviton, not yet discovered which may be the carrier particle of gravitation. Experimentally, after the high powered electron microscopes were invented, and theoretically, after quantum mechanics were developed during the last century, atoms and molecules have been found to have various types of vibrations, motions, oscillations, penetrations, collisions and excitation etc. Furthermore, it has been mentioned in the Bhagavati sutra that one to infinite *paramanus* can exist or coexist in a unit space. This is similar to the behaviour of bosons which follow the Bose statistics, discovered in the early part of the last century. Satyendra Nath Bose, in 1924 developed statistics dealing with particles, which are indistinguishable, but can coexist in the same space. These particles are called bosons after him. There are two types of particles: fermions, with spin 1/2 (e.g. electrons), which follow Fermi-Dirac statistics and Bosons with spin 1 (e.g. photons) which follow Bose-Einstein statistics. Two identical fermions, being in the same state, cannot be in the same space, i.e. they follow Pauli's Exclusion principle whereas two identical bosons can coexist in the same space. Thus each indistinguishable, i.e. identical in all respects, fermion occupies a separate space. In comparison, at low temperatures, bosons can behave very differently compared to fermions because an unlimited number of them can occupy the same energy space. This concept has led to formation of Bose condensates at very low temperatures. Since innumerable *paramanus* can occupy a unit space, they can be treated as bosons. If *paramanus* are the smallest unit of matter of which the whole material universe is made of, how fermions are formed, remains a mystery and remains a point of further investigation. Jain philosophy invokes *anuvargana* to form atoms out of *paramanu*. When innumerable *paramanus* form aggregates, *anuvargana* is formed (discussed in Bhandari, 2015). *Paramanu* is the smallest material entity. They combine in integral numbers and thus quantum mechanics is inherent in aggregation of *paramanus* and disintegration of their aggregates. Thus we see that many concepts exist in Jainism which can help us develop sub-quantum physics, involving *paramanu* and the processes of their aggregation, from which probably quarks and other particles are eventually formed.

In addition, Sthanang sutra mentions *Krishnaraji* (Black Giants) and *Tamaskaya* (Dark bodies), which some scholars have interpreted as Blackholes, which are massive invisible stars, discovered astronomically only a few decades ago. They are so massive that space curves around them and light cannot escape them and hence they cannot be seen. Several Agamas give details of their numbers, shapes and sizes. Acharya Vijay NandighoshSuriji (2001) has summarized the details given in the Agamas and have argued that their description does not agree with the properties of Blackholes. *Tamaskaya* can also be translated as invisible bodies or could be Dark matter but this is all speculative, requiring further work to confirm.

**1.2 Concepts**

Besides various isolated discoveries, some examples of which have been mentioned above, several concepts are common to Jain philosophy and modern science. We may take up some of these concepts here.

 1. *Parasparopagraho Jivanam* and Entanglement: *Parasparopagraho Jivanam* is the core principle of Jainism. It states that all life forms depend on each other; no one can exist in isolation as an independent entity. This translation has a very narrow scope and is limited to only living beings. Recently, at particle level, the phenomenon of entanglement has been discovered. It states that two particles produced in the same interactions remain entangled, i.e. behaviour of one totally depends on the behaviour of the other, irrespective of the distance between them. Their properties depend on each other such that if properties of one particle (e.g. spin=1/2) is measured, that of the other can be predicted (spin will be -1/2). In view of this phenomena, this sutra can be translated, in a broader perspective, as 'Every *jiva* (and *pudgal*), depend on other *jivas* (and *pudgalas*); not only it has no independence, it cannot become independent in any way'. Our existence, well being, behaviour etc. thus depend on the existence, well being and behaviour of others.

 2. Concept of Indescribability: The other concept which has found common ground with quantum mechanics is indescribability. *Saptabhangi* or seven modes of predicament enunciated in Jainism has one mode which exists but is indescribable (*Avyaktavya*) in any language or mathematically. The wave particle duality also predicts that one of their modes cannot be described (see Bhandari and Pokharna, 2017).

3. Smallest units of space (*pradesha*) and time (*kalanu*, *samaya*): According to Jainism, space and time are quantized. Jainism mentions a *pradesha* which is the smallest unit of space. This concept of quantum of space can be compared with Planck's length (√(hG/2п c3) where G is the Gravitational constant, h is the Planck's constant and c is the velocity of light. It is calculated to be 10-35 meters wherein, due to the Heisenberg's Uncertainty Principle, deterministic laws of physics are not valid. Similarly there is mention of ‘*samaya*’, smallest unit of time in Jain philosophy and some scholars talk of*kalanu*, a quantum of time, which can be, conceptually, if not quantitatively, compared with Planck time (√(hG/2п c5) which is calculated to be 10-43 seconds. Jainism also definesinnumerable*atmapradesha* for every soul or the smallest unit of soul (soul points). Since science does not subscribe to the concept of soul (*Atma*), a comparison is not possible.

4. Fundamental concepts like *Syadvada*, *Anekantavada*, *Nayavada* have been enunciated by Jain philosophy and since they have been discussed elsewhere (Bhandari, 2017; Bhandari and Pokharna, 2017), we will not repeat them here.

**1.3.Laws**

We now turn to some basic scientific laws which have similarity between science and Jainism.

 1. Law of conservation: Conservation implies that certain entities are conserved in all processes i.e. some basic entities can never be destroyedand nothing can be created from nothing. This has been a basic concept of Jainism which led to the concept of *eternal existence* of certain entities. According to Jainism, the universe consists of six substances (*Dravyas*): living beings (*jiva*), Space (*aakash*), *pudgal* (*matter*), time (*kaal*), *dharmastikaya* (traditionally considered to be the medium of motion and *adharmastikaya* (medium of rest). This *shat*-*dravya* model, what we call as Hexa-D model, is based on the laws of conservation. None of these *dravyas* can be created or destroyed and hence they have to be eternal, exist for ever, without being created or destroyed i.e. they have no origination,beginning or end. The need for six *dravyas* also arises because one cannot be produced from another: time cannot beproduced from matter, living beings or space etc., nor motion can be produced from space or matter etc. If it were possible, e.g. if matter can produce motion, then matter would start moving by itself. If space could produce matter, over the long age of the universe, enough matter would be produced spontaneously from space and universe will contract due to its gravitation. Since such phenomena are not observed, it is clear that we need all these six independent *dravyas* to explain the observed phenomena. Furthermore, if they could be produced from each other, we will not need laws of conservation of momentum etc. as discussed below. This can be termed as the Law of Exclusive Properties.

Law of conservation is the underlying law of all physical and chemical phenomena, as formulated in modern science. Energy, mass, velocity etc. cannot be produced from nothing; they are always conserved even as mass and energy are converted from one to the other. Similarly all other basic properties, like angular momentum, linear momentum etc. are conserved.

 2. Causality: Cause and effect are always related; According to Jainism, one has no existence without the other, i.e. every cause has an effect and there is no effect without a cause. This is applicable to *Jiva* as well as the physical universe. When it is applied to *jiva*, it is called Karmavada. In scientific theories, dealing with the physical universe, it is termed as Causality.

 3. Determinism: Determinism is the basic law dealing with the physical universe. If one knows the conditions or values of all parameters of a system, involved in a process at any instant of time and the laws governing the process are known, one can predict the state of the system at any time in the future or past. This is the basis of mechanics. In Jainism, it is called *Krambadhha Paryaya*.

 4. Newton's First law of motion: The law of inertia or Newton's first law of motion states that a body continues to move in a straight line (or remain in a state of rest), unless acted upon by a force. This is stated in the Agamas in the case of a soul that the soul moves in a straight line, while moving within a *loka* or from one partof *loka* to the other.

Apart from concepts and laws of physics, many a discoveries were made by Jain saint-mathematicians during the first millennia of Christian era and they discovered many rules of calculations, conceived series and subseries and large numbers, as summarized by Shah (2017) and Jain et al., (2017). The work of Sridhar (799 C.E.) and Mahaviracharya (814-877 CE) related to the Number theory, Fundamental Operations, Set theory, Fractions, Simple, Quadratic, cubic and higher order equations, permutations and combinations deserve special mention. Nemichandra Siddhantachakravarti (10th Century CE) deals with 14 sequences, concept of infinity of various types in his work Trilokasar (Shah, 2017).We will not go into details because they have been discussed in the papers quoted above. Some of these concepts and numbers are credited to European mathematicians who discovered them much later.

The above should be considered only as illustrative examples. Possibility of many such concepts and laws described in the Agamas remains unexplored.

**2. Topics of disagreement between Jain philosophy and modern science**

Although due credit must be given to Jain thinkers for the above discoveries, there are several aspects of geography, planetary sciences, cosmology etc. where glaring disagreement with scientific concepts is found. These relate to units of time (*Kodakodi* etc., larger than the age of the universe) and space, body size of Tirthankaras, existence of two Moons and two Suns, going round the Earth, shape of the Earth (Disk shaped Earth) etc. and are clearly in error because modern concepts are based on rigorous observations. As far as cosmology is concerned, the *Lokakasha* or the Universe is described as static having a shape akin to a man standing with his elbows stretched out. Theories of modern cosmology and forces of physics indicate that such a structure would be unstable and cannot exist for a long time. The scientific theories and observations can be incomplete in some aspects and are subject to refinement but they cannot be wrong. Since they are based on observations, they are basically correct. Some of the errors in Jain concepts may be due to erroneous interpretation as has been pointed out by J.R. Jain and discussed by Jain et al (2017) and Bhandari (2015). We prefer not to discuss these controversial aspects here.

**Table 2. Comparison of certain concepts and laws in Modern science and Jainism**

**Science and Jainism**

**some basic conceptual similarities**

**Science (Material world)**

•

Causality

•

Complementarity

•

Determinism

•

Entanglement

•

Principle of Uncertainty

•

Law of conservation

**Jainism (Living & non**

**-**

**living)**

•

Karmavada

•

Anekantavada

•

Krambaddhaparyay:

•

Parasparopagraho jivanam:

**Interdependence of all living beings**

Syadavad

•

Eternal nature of Dravyas

13

**3. Modern problems and solutions offered by Jain life style**

Having established the scientific insights enunciated by Jain philosophy as well as some disagreements, possibly due to erroneous interpretations, we now address the most pressing problems of the modern era. To be brief, we will be selective and discuss only some of them, i.e. environmental pollution of atmosphere, rivers, lakes and oceans, unsustainable development based on excessive use of natural resources, shortage of essential items like water, food and homes, unequal distribution of resources amongst various nations and strata of the society, poor physical and mental health, personal and social crimes and wars between nations and disparities in the society, intolerance, extreme violence in form of terrorism and mental stress, in spite of unprecedented comforts available to mankind.

Solutions to all these can be found in the observance of Jain principles and recommended life style, within the framework of five *mahavratas (satya, ahimsa, aparigrah, achorya* and *brahmacharya), anuvratas* and Jain practices. Some of these will no doubt be discussed in other presentations at this conference and therefore we need to be brief here. Table 3 gives problems with their corresponding solutions within the framework of Jain philosophy.

Table 3. Modern problems and Jain framework of solutions

|  |  |  |
| --- | --- | --- |
|  | **Problems** | **Solutions** |
| 1. | Environmental pollution, unsustainable developmentShortage of natural resources. Unequal distribution and disparities, consumerism and wastage of resources | *Aparigrah*, minimising one’s needs |
| 2 | Health issues | Jain practices of regulated diet, yoga, penances |
| 3 | Social and family crimes | *Achorya*, *ahimsa*, *Aparigrah*, *Brahmacharya* |
| 4 | Intolerance | Forgiveness, compassion, following *anekantavad* |
| 5 | Violence | *Ahimsa*, compassion, following *karmavada* |
| 6 | Mental stress | Meditation, prayers |

All these solutions are spontaneous and automatic, if one understands the basic laws propounded by Jainism that govern the life processes. These laws relate to *Atmavada, Karmavada, Kriyavada, Lokavada, Anekantavada* and *Syadvada.* Faith in*Atma*, rebirth, causality (*Karma*) and its consequences,are adequate to direct one's actions towards solutions to all the problems cited above. These laws must be realized and adopted by an individual in his/her thoughts and daily activities. Jainism considers the universe to be real (and not illusory, as some other oriental faiths propound) and the Truth is interwoven in the processes occurring in the universe. One must therefore make all the efforts to realize, understand, be aware of the consequences and follow all the laws operating in the universe in his/her life style.

How can, then these lawsbe understood? The first and foremost is the realization that *atma* exists. *Atma* is not physical, it is non-corporeal, cannot be seen or scientifically proven. According to Jainism, consciousness is the continuous activity of *atma*. Now scientists do not subscribe to the existence of *atma* but they have slowly but surely started working on understanding consciousness. There are increasing number of renowned and accomplished scientists who believe that everything in the physical universe cannot be explained by the known laws of physics and one has to involve consciousness (seeAgrawal, 2017). Consciousness, as also paranormal (psi) phenomena, remains pressing topics of research today. Whether paranormal phenomena like telepathy, migration of soul, clairvoyance etc. is real or just a part of fantasy? And understanding consciousness may possibly lead us to the existence of *Atma*, because, according to Jainism, consciousness is the activity of the soul and one cannot exist without the other. We, therefore, discuss here the present state of understanding of consciousness and the problems associated with its various definitions. There are basically three views: the materialistic view, the Vedantic view and the Jain view. We will briefly discuss all three of them.

4. **Modern problems of understanding consciousness, paranormal phenomena: materialist and Vedantic view**

The comparison of some features of science and Jainism, discussed above, gives us some confidence that Jain scriptures contain some principles and concepts which were unknown to science till recently. The possibility that something new can even now be found in Jain scriptures, hitherto undiscovered by science, certainly exists .We therefore discuss one of the most pressing problems of modern era and see if we can get some insight from the Jain philosophy. This problem is related to consciousness. Consciousness is the core of Jain philosophy, around which the whole edifice of Jain *Darshana* has been developed. *Atmavada*, the doctrine of existence of *atma* (soul) is the foundation of Jainism and consciousness (*chetana*) is defined as the perennial activity of every *Atma*. It is termed as '*upayoga*'. Consciousness cannot exist without *Atma* and *Atma* has to be involved in this activity all the time. *Jnana* and *darshana*, these two activities go on in *atma* all the time, even after it attains pure state.

We first discuss the views of Vedanta and modern scientific approach in understanding *chetana*, and then compare these views with the Jain thought.

**4.1. Vedantic (Biocentric) view**

To describe the Vedantic or Upanishadik views, we follow the description given by Swami Bhakti Niskama Shanta and Vignan Muni (Shanta, 2015).The Vedantic view is a Top down view, beginning with the all powerful Brahmn, or God, the creator and leading to the material Universe. The Brahmn or God is endowed with all powers so that He can do anything including miracles. Several Upanishads, especially Praśna and Māndūkya, present a coherent and rational series of concepts about mind, thought and consciousness. According to Upanishads, *Ātmā*is the ultimate, changeless, non-material substance underlying this ever-changing material Universe and it is also the cause of all causes. YogVashishta defines *atma* in the following way: ‘Eyes cannot see it but eyes cannot see without it. Mind cannot perceive it but mind cannot perceive anything without it and so on’. Geeta describes it as the one whom fire cannot burn, weapons cannot shatter etc. i.e. it is non-physical. The constitution of *Atma* is *Sat*, *Chitta* and *Ananda* or ‘Existent–Conscious–Bliss’. Of these, *Sat* is pure existence. It is that which always exists and does not have a state of non-existence. While everything that appears as an object in this universe has a beginning and an end and is subject to change all the time, *Sat* is eternal. Material objects come into existence, persist for some time and then go into non-existence (destroyed). That is, their existence is limited by time and space. So, existence in this universe is alwayssubject to change in form and name (modes or *paryaya*). How can material objects emerge from a purely non-material *Atma*? This becomes possible because opposites coexist. In physics, it is known as the principle of Complementarity.

 The second aspect of *Atma* is *Chitta*. It is Pure Consciousness. That means, *Chitta* is not simply the consciousness about this or that object, it is absolute consciousness having no physical boundaries. It is an exclusive and essential feature of living beings. It defines life. In beings, it is with the help of *Chitta* that the embedded information in the genes is activated, as a result of which the seed/cell grows into the pre-designed form, particular to each species.

The power of *Ātmā* to express or manifest himself in many forms is called his *Māyā* or *Prakrti*. *Atma* remains in its pure state in the beginning and in the end. For the purpose of creation, *Atma* (*purusa*) invokes his power of *Māyā* (or *Prakrti*) and the entire universe is thus projected and withdrawn periodically. Creation started with the production of *Rayi* and *Prāna*. *Rayi* is simply the physical energy and *Prāna* is the energy of life. Having its centre in *Hrdaya* (Heart), consciousness pervades the entire body. Consciousness provides the energy for cognition and action to all the organs of sensation and action. We have got five organs of sensation, namely, ears, skin, eyes, nose and tongue; and five organs of action, namely, mouth, feet, hands, organ of excretion and organ of procreation. In addition to these, humans have four instruments for internal action, which together are known as ‘*Antahkarana’*. The four components of *Antahkarana* are ‘*Manas’*, ‘*Buddhi’*, ‘*Ahamkāra’* and ‘*Chitta’*. These are actually notional divisions of brain-functions, designed for the purpose of better and systematic understanding of internal activities. Of the four *Antahkarana*(s), *Manas* is involuntary in its functions, just like heart-beat, breathing, etc.; *Buddhi* is voluntary. *Ahamkāra* and *Chitta* are neither voluntary nor involuntary. *Atma* is pure consciousness whereas *Chitta* is consciousness about various things.

The Vedantic or Biocentric concepts agree with the Jain concepts in many ways but there are important differences. The main difference is that Vedanta creates everything in the universe from only one source i.e. *Paramatma*, who is omnipotent and has miraculous powers whereas Jain proposes six *dravyas*, *Param*-*atma* or Brahmn being only one of them. No miraculous powers are needed and every phenomenon is governed by certain well defined laws. As far as consciousness is concerned, three layers of cognition, beyond Manas have been proposed in Vedanta. *Manas*, is that part of the *Antahkarana* which acts as regulator and co-coordinator of the activities of sense organs and motor organs. ‘*Manas’* receives signals (data) from the senses, processes them with reference to the stock of information (memory), already available in the *Chitta* and thereby constructs valid perceptions. This is how we see, hear, taste, smell and feel and thereby cognize facts and objects. Signal is only data. To organize the data into information, *Buddhi*, usually translated as wisdom, but actually is more than passive wisdom, actively performs some kind of integration and organization of data and converts information into useful perception, checks on the access of information from *Chitta* which *Manas* does for the purpose of construction of valid perceptions in respect of sense-signals conveyed to it.*Chitta*, the abode of *chetana* resolves the ‘Hard problem’ i.e. Qualia or changing information into experience (Chalmers,1996) and the ‘Binding problem’i.e. integrating all the sensory information in the brain into one ‘whole’.

**4.2 Materialistic view**

 The Materialist view is the Bottom-up approach, starting from matter and ending in consciousness. In modern scientific models, specifically the Orch-OR model of Hameroff (2012), consciousness (or soul)is considered to be an emergent property of matter. There are trillions of neurons and synapses in the human brain. When the neural network in the brain attains a certain critical degree of complexity, consciousness emerges by itself, just like the Djinn of Aladdin's lamp, as Huxley put it. Deepak Chopra describes it as non-local (meaning everywhere), not in space and time (eternal), quantum mechanical entity. Thus Jain concepts and modern scientific concepts of consciousness do not agree with each other- are rather opposite of each other. Some controversies arise, largely because of different definitions of consciousness. According to Jainism, the modern scientific models only describe the *'conscious'* decision making process on a physical plane, exercised by consciousness and is not consciousness itself. From the Jain point of view, it is essential to assert that it is consciousness, which is solely the activity of the soul, manifests through the whole body (i.e. every cell of the body and not limited to brain), to different extent, depending on the capacity and health of the brain and the body (sense organs) and uses brain to take decisions, according to its choice, as we shall see below.

**4.3 Jain view**

The basic speciality of Jainism is that *atma* and hence consciousness in all living beings is identical, equally powerful and has the same inherent potential. It manifests to different degrees in different species and different individuals because of the capacity of their brains and the sensitivity of their sense organs. Besides brain, the manifestation of consciousness is related to Karma (both *Sanchit* (accumulated) and *Arjit* (currently acquired). In Jain philosophy, Karma, *Jnana* and manifestation of *chetana* are interrelated. As karmas are shed, *Jnana*, automatically acquires higher state and *chetana* manifests to greater extent. Karmas and *chetana* have been in constant interaction since eternity. This interaction is due to a power of the *atma*, we call ‘Free will’. Because of free will, *atma* or consciousness can make three choices: (i) It can either take a decision for the good of everyone and that leads to *punyabandh*. (ii) It can take a bad decision which is harmful to everyone (or some) and that leads to *paapbandh* or (iii) it can take a decision without passion or emotionally involving one-self, i.e. passively. This leads to no *bandh*. This way *atma* has been accruing karmas of various types since eternity. Till all the karmas, both *paap* and *punya* karma, are shed by resorting to Jain practices of nonviolence, search for truth, *aparigrah*, *achorya*, *Brahmacharya*, self discipline and penances, one cannot get liberated. When karmas are totally shed, *kevaljnana* automatically and spontaneously arises, atma becomes pure and one attains *Siddhahood*. This Jain model of consciousness, based on ancient Jain texts, needs to be developed further.

From the above discussion, it seems possible that Jain concepts can show the way in understanding some aspects of current scientific research, particularly about various phenomena associated with sub quantum physics and consciousness.

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