

Jainism And Modern Science: A Comparative Study

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This article presents some basic concepts of the Jain philosophy in the light of modern scientific premises and theories. No attempt has been made to bring the ancient theories in line with modern science through forced, distant and misleading analogies.

Introduction:

Religion is the science of living, and, science and technology are essential for sustaining life on earth. Thus religion and science are two sides of the same coin. The Sanskrit word for religion is DHARMA, which literally means attributes. Thus religion deals with the attributes of human life - of soul and matter. Religion teaches us the way to lead a healthy, meaningful and fulfilling life. It tells us how to deal with our fellow men and with other living beings. Religion is supposed to bring out the best in human beings.

Science is the systematic and accurate knowledge of things and events that occur in nature. It is the study of matter and energy, plant and animal life, the utilization of natural resources without altering the delicate balance in nature, making human life better on earth without hurting the environment - the vegetable and animal kingdoms. Science and technology advance continually and thus life on earth keeps on changing, mostly for the better. Religion, being the science of living, is also supposed to change with time. In the present article, some features of Jainism are compared with modern science in light of the above ideas.

The Scientific Process and The Three Jewels of Jainism:

The scientific process consists of the following steps:

1. Making observations with an open mind without any bias.
2. Seeking a rational explanation of the observations and building a consistent theory.
3. Performing further experiments to test and extrapolate the theory.

For centuries, science has advanced by way of the scientific process and the state of scientific knowledge is still progressing. A theory is upheld as long as it provides a rational explanation of experimental observations and fits the current structure of scientific knowledge. If any theory proves to be inadequate due to some changes in the state of scientific knowledge or in view of further experimentation, it is discarded and replaced by another theory. There is no room for dogma or preconceived notions in science.

The scientific process is similar to the three jewels of Jainism (RATNATRAYA). These are rational perception (SAMYAK DARSHAN), rational knowledge (SAMYAK JNAAN) and rational conduct (proper lifestyle, SAMYAK CHAARITRA).¹ Rational perception involves observing and studying nature – living and non-living, without any bias or preconceived notion. However, this does not preclude the study of religion, philosophy and science. After careful observation and thought comes rational knowledge.² This does not necessarily imply knowing and accepting what is written in the holy books or what is preached by a learned person. The third jewel in the life of a Jain is rational conduct – adopting a proper lifestyle. This leads to the concept of nonviolence in Jainism, which involves living in harmony with fellow beings and with nature. It should be emphasized that rational conduct does not end with such religious activities as worship, prayers, chanting, attending sermons and study of scriptures. On the other hand, indulging in these religious activities is undesirable if it is done with intent of show, pride, desire of material comforts in this life or in the after-life. Rational conduct involves being at peace with oneself and with one's sentient and insentient environment. In fact, one of the purposes of various religious activities is to learn and adopt a proper lifestyle. Just as schooling is for career development, similarly, prayers, worships, religious discourses and study of scriptures are for adopting rational conduct.

¹ The Sanskrit word SAMYAK means rational and proper.

² PRAMAANANAYAIRADHIGAMAH:

Knowledge is attained through experimentation (experimental proof, PRAMAAN) and logical thinking. Acharya Umaswati in TATTVAARTH Sutra

It should be emphasized that rational conduct entails minimizing violence of feelings of the self and of other living beings. Thus nonviolence is said to be the supreme religion. Further, activities such as telling a lie, stealing, greed and materialism entail violence of self as well as of other living beings. Therefore, the practice of nonviolence requires being truthful, non-stealing and avoiding the acquisition of unnecessary materials. This is also good for the environment.

The Jain Theory of Karma and the Scientific View of Natural Phenomena

According to modern science, all natural phenomena involve interactions between matter and energy. Such interactions occur according to the laws of nature – the intrinsic attributes of the substances involved. Water from rivers and oceans is evaporated by the rays of the sun. The water vapor rises, clouds are formed and it rains. Thus rain is the result of the interactions between solar energy, water, atmospheric particles and wind. Such interactions take place because of the intrinsic properties of the particles of matter involved and solar energy. Charcoal burns because atoms of carbon have the capability of combining with atoms of oxygen. There is repulsion between similar electric charges and attraction between dissimilar electric charges. Therefore a proton that is positively charged attracts a negatively charged electron. The electronic circuit of a radio receiver detects radio waves, amplifies and rectifies them, and, converts electromagnetic energy into sound energy. On microscopic scale, matter (atoms, electrons, etc.) and energy (electromagnetic waves) possess certain attributes. Consequently, on macroscopic scale, the components of the radio receiver and radio waves perform some specific functions, which are responsible for the working of a radio set. These are examples of interactions between matter and energy. The Jain theory of karma deals with the interactions between soul and ultra fine particles of matter.

According to the Jain theory of karma, ultra-fine particles of matter known as karma are associated with the souls of all worldly beings. Such souls are said to be impure on account of their association with material particles. Further, activities of the lives of worldly beings involve the following interactions between their souls and karma particles:

- (a) A worldly being has thoughts and feelings of various kinds resulting in the influx and binding of ultra-fine material particles of various types with the soul. This is known as influx (ASHRAV) and bondage (BANDH) of karma.
- (b) The karma particles associated with the soul may influence the thoughts and feelings of the worldly soul.
- (c) The soul involuntarily or voluntarily sheds certain karma particles. This is known as shedding (NIRJARA) of karma.
- (d) The karma particles in the possession of the soul of one subclass or intensity can be transformed by the soul into karma particles of another subclass or intensity. For example, the pleasant-feeling-producing karma (SAATAAVEDANEEYA karma) can be transformed into unpleasant-feeling-producing karma (ASAATAAVEDANEEYA karma) and vice versa.³ We shall call this as the transformation of karma particles.

In addition to karma particles, there are pseudo-karmas (NOKARMAs) as well. These include the surroundings of the worldly being such as body, food, clothing, family and other living and non-living environment. A worldly soul experiences pleasure and pain due to its association with karma and pseudo-karma. The feelings and emotions of different kinds initiate and regulate the interactions between the soul and karma particles. However, soul is the master of self and the master of karma, especially in view of the interactions of type (d).

For example, consider three students, Sheila, Sam and Padma, who have to take the same examination. Suppose all three have the same kind of (say, unfavorable) karma associated with their souls. Padma studies and prepares well for the examination, takes the examination with composure and ends up with a good grade. Thus Padma succeeds in transforming the unfavorable karma particles associated with her soul. Sam and Sheila fail the examination. Sam gets upset

³ TIRTHANKARA MAHAVIRA AUR UNKI ACHARYA PARAMPARA by Dr. Nemi Chandra Jyotishacharya, published by Jain Vidwat Parishad, Sagar, M.P., India, page 393.

and angry. He blames his karma and pseudo-karma (teacher, books, school system, weather, etc.) for his failure. He feels miserable and acquires more undesirable karma particles. Sheila takes her failure in stride and makes a determination to study regularly in the future. Obviously, she accumulates karma particles that are of a different kind from those obtained by Sam.

It should be pointed out that only impure souls experience pleasure and pain on account of their association with matter (bodies and their surroundings). Souls that have purified themselves by shedding all karmic particles enjoy their pristine attributes. Moreover, each individual soul is independent. The pseudo-karmas such as a teacher, a visit to the temple, going to a movie or a health spa are merely instrumental causes (NIMITTA KAARAN). These may or may not become instrumental in generating feelings and emotions of one kind or another. Thus the same pseudo-karma may be instrumental for the influx of karmas of different types and intensities in different individuals. This process can be compared to a chemical reaction that proceeds differently and, in certain cases, results in different products, depending on the experimental conditions. In any given situation, characterized by the presence of a set of karmas and pseudo-karmas in one's possession, an individual may have (or may lack) the willpower to regulate one's feelings and emotions. Consequently, the individual can control, to a lesser or a greater extent, the consequences of karmas in his/her possession. Further, the individual can also influence the influx of new karma particles.⁴ This is the phenomenon of mind over matter.

Realization of the fact that soul is different from material particles (karmas and pseudo-karmas) and that a pure soul is not influenced by material particles is known as the science of differentiation (BHED VIJNAAN). This leads to penance (TAPAH - absence of feelings and emotions - absence of all desires (ICHCHHAANIRODHASTAPAH).

⁴ TEEVRAMANDAJNAATAAJNAATABHAAVAADHIKARANAVEERYAVISHESHEBHYAS-TADVISHESHAH |

The influx of karmas is differentiated on the basis of thought-activity tainted with intensified (TEEVRA) or tempered (MAND) passions, intentional (JNAAT) or unintentional (AJNAAT) nature of action, characteristics of substratum (ADHIKARAN) and scope of potency (VEERYA).

- Acharya Umaswati in TATTVAARTH Sutra, Chapter 6, aphorism 6

Penance causes shedding of karmas (NIRJARA)⁵ and prevents the influx of new karma particles. Eventually, the soul sheds all karma particles and attains salvation (NIRVANA) – the pristine state. In Jainism, each individual pure soul is God. A pure soul has absolute perception (ANANT DARSHAN), absolute knowledge (ANANT JNAAN) and eternal bliss (ANANT SUKH).

It should be pointed out that even the desire to accumulate ‘good’ karma or the desire to attain a heavenly state of existence (SWARG) or salvation causes the influx of karma of one kind or another. The rational way is to just inculcate human qualities – live every moment of life being guided by the three jewels of rational perception, rational knowledge and rational conduct. It is a rather difficult path to follow and one can only try one’s best.

Matter and energy

According to Jainism, matter (PUDGAL) has the following four attributes:

Touch (SPARSH), taste (RAS), smell (GANDH) and color (VARNA).⁶

Touch is of two kinds: smooth (SNIGDHA) and rough (ROOKSHA). The Sanskrit words SNIGDHA and ROOKSHA are commonly interpreted as smooth and rough, respectively. However, in SARVAAARTHA-SIDDHI, Acharya Pujiyapad has written:

SNIGDHAROOKSHAGUNANIMITTO VIDYUD ...

This literally means that lightning occurs on account of the SNIGDHA and ROOKSHA attributes. On this basis, Prof. G. R. Jain has identified the SNIGDHA and ROOKSHA kinds of touch with positive and negative kinds of electrical charges.⁷ Thus SPARSH refers to electrical charge.

⁵ TAPASAANIRJARA CHA |

- Acharya Umaswati in TATTVAARTH Sutra, Chapter 9, aphorism 3.

⁶ SPARSHARASAGANDHAVARNAVANTAH PUDGALAAH |

- Acharya Umaswati in TATTVAARTH Sutra, Chapter 5, aphorism 23

⁷ Cosmology: Old and New by Prof. G. R. Jain, published by Bharatiya Jnana Pitha, second edition, page 160.

Further, color (VARNA) can be related to the characteristic radiation emitted and absorbed by the nuclei, atoms and molecules of various kinds. Possibly, the words RAS and GANDH also do not have their common literal meanings in this context. Incidentally, the names given by modern scientists to the attributes of some elementary particles are charm, flavor and color. In this context, these words also have meanings at variance with their common meanings.

One special aspect of the Jain concept of matter (PUDGAL) is that various kinds of energy such as light, heat, sound and images have been enumerated as transformations of matter.⁸ The equivalence of mass and energy, presented below, which is a consequence of the theory of relativity, is in complete agreement with this concept of the Jain theory of matter. Further, according to Jainism, the binding of the various particles, atoms and molecules, is said to occur because of the SNIGDHA and ROOKSH attributes of matter⁹ - a concept in perfect agreement with modern science.

Relativism (SYAADAVAAD), Einstein's Theory of Relativity and Quantum Mechanics

The Jain doctrine of relativism (SYAADAVAAD or ANEKAANTA-VAAD) is unique in Indian philosophy. It states that the result of an observation depends on the viewpoint of the observer. There are seven aspects, which are useful in the observation and interpretation of the entities, and of events that occur in the universe:

1. The positive aspect (SYAADASTI)
2. The negative aspect (SYAADANAASTI)
3. The confluence of positive and negative aspects (SYAADASTI-NAASTI)

⁸ SHABDABANDHASAUKSHMYASTHAULYASAMSTHAANABHEDATAMASHCHHAAYAA
TAPODYOTAVANTASHCHA

- Acharya Umaswati in TATTVAARTH Sutra, Chapter 5, aphorism 24

⁹ SNIGDHAROOKSHVAD BANDHAH I

- Acharya Umaswati in TATTVAARTH Sutra, Chapter 5, aphorism 33

4. The inexpressible aspect (SYAADAVAKTAVYA)
5. The positive inexpressible aspect (SYAADASTIAVAKTAVYA)
6. The negative inexpressible aspect (SYAADANAASTIAVAKTAVYA)
7. The confluence of positive and negative inexpressible aspects (SYAADASTINAASTIAVAKTAVYA)

It is rather difficult to completely understand the implications of the doctrine of seven aspects (SYAADAVAAD). On the surface, the positive, negative and inexpressible aspects and their confluence appear to be inconsistent. However, these different aspects can be seen to be compatible with each other as is evident from the following examples:

(a) Is a teakettle indestructible?

According to the law of conservation of matter and energy, the teakettle is indestructible. This is, say, the positive aspect. However, the teakettle is subject to a variety of transformations. It can be broken up into a number of pieces and can be turned into some other object. Thus from this point of view it is not indestructible. This is the negative aspect. A compromise of positive and negative aspects can easily be made in this case.

(b) Is there a magnetic field associated with an electrically charged sphere placed on the surface of the earth?¹⁰

According to modern science, there is no magnetic field associated with a charge at rest. However, a charge in motion has a magnetic field associated with it. Thus if a scientist on earth performs an experiment to detect the magnetic field due to the charged sphere, the result will be negative. But the charged sphere on earth is in motion relative to a spacecraft. Thus if an astronaut

¹⁰ Cosmology: Old and New by Prof. G. R. Jain, published by Bharatiya Jnana Pitha, second edition, pp. Viii-ix.

on the spacecraft performs an experiment to detect the magnetic field due to the charged sphere, the result will be positive. This indicates that the result of an observation depends on the viewpoint of the observer.

(c) If a coin is tossed, will it come up heads or tails?

Obviously, it is impossible to predict the outcome of the toss. This is an inexpressible aspect. Now if the coin is tossed 20 times, it is reasonable to expect that it will come up heads 10 times. However, in any given set of 20 tosses, there is a certain finite probability of its coming up no heads at all, there is a certain finite probability of its coming up heads only once, there is a certain finite probability of its coming up heads twice, and so on and so forth. Obviously, the answer to the question depends on the point of view adopted in answering it.

(d) Consider a ball tied to the end of a string being whirled round and round at a constant speed. It is fairly easy to determine the position of the ball at any instant of time. Now according to modern science, a hydrogen atom consists of an electron revolving around a proton. In this instance, it is not possible to predict the position of the electron precisely. This is the inexpressible aspect. Now if we determine the positions of electrons in a large number of hydrogen atoms at a given time (or if we determine the positions of the electron of a single hydrogen atom at different instants of time), it is found that there is a definite probability of finding the electrons (electron) at a distance of about 0.0000000053 cm from the protons (proton). Note the similarity between the present experiment and the experiment of tossing a coin described in the previous example.

There are a rich variety of experiments in modern science that illustrate the doctrine of seven aspects. According to Einstein's theory of relativity, the result of an observation depends on the relative motion of the frames of reference in which the body being observed and observer are situated. Thus, if an astronaut in a speeding spaceship, observes the length of a rod, the time interval between two events and the magnetic field due to charged sphere, all placed on the earth, his observation will

differ from those of a scientist on earth. Two consequences of the theory of relativity, which have been verified experimentally, are:

1. The mass of a particle increases with its velocity.
2. Energy = mass x (speed of light)².

This is the famous mass-energy equivalence equation, which indicates that mass can be converted into energy and energy can be converted into mass. A certain quantity of mass is totally annihilated and converted into energy in atomic reactors. In the phenomenon of pair production, energy is converted into mass, i.e., a pair of electron and positron (positively charged electron) is created out of energy.

According to modern science, in certain experiments, light waves (electromagnetic waves) exhibit properties of wave motion and in certain other experiments, they behave like particles known as quanta.¹¹ Quantum mechanics (which is also known as wave mechanics) is the branch of science that deals with the behavior of quanta. A fundamental postulate of quantum mechanics is Heisenberg's uncertainty principle (or the principle of indeterminacy). It states that it is impossible to simultaneously determine the precise position and the precise momentum¹² of a particle. Similarly, it is not possible to determine the precise energy of a particle at a given instant of time. Much of modern scientific research is based on the principle of indeterminacy and quantum mechanics. Further, there is a branch of science called relativistic quantum mechanics in which aspects of the theory of relativity are incorporated in quantum mechanics. Researches in quantum mechanics and relativistic quantum mechanics have led to a great deal of scientific progress. Evidently, it is not possible to establish a one to one correspondence between the theory of seven aspects, and, the theories of relativity, quantum mechanics and relativistic quantum mechanics. Nevertheless, it is seen that the principle of uncertainty is somewhat similar to the inexpressible aspect, and, the theories of relativity and quantum mechanics are parallel to the Jain doctrine of relativism (SYAADAVAAD). Similar to the Jain theory of relativism, relativity states that the results of our observations depend on our frame of reference.

¹¹ Incidentally, this is another example of the inexpressible aspect.

¹² Momentum = mass x velocity.

Further, according to Jainism, the inexpressible aspect is one of the means to unveil reality; in modern science, the principle of indeterminacy, is a powerful tool to study natural phenomena.

To a scientist, the theories of relativity and quantum mechanics provide powerful tools for scientific research and advancement of scientific knowledge. To a human being, the doctrine of seven aspects, not only provides a means for achieving rational perception and rational knowledge, but it also furnishes an effective means of living at peace with the self and the surroundings. The rational perception, rational knowledge and rational conduct can come about only if we understand different viewpoints. Peace and harmony can come only if we try to understand other's position. Thus the doctrine of relativism is the basis for acquiring the knowledge of reality and it is also fundamental for adopting a proper lifestyle. It should be pointed out that understanding others' viewpoint leads to absence of anger (KRODH), pride (MAAN), deceit (MAYA) and greed (LOBH). This results in the prevention of karmic influx (SAMVAR) and shedding of karma particles (NIRJARA). This is the path to happiness and peace in life and ultimately salvation (NIRVANA).

Conclusion

It is evident from the above discussion that the broad premises of Jainism and modern science agree to a great extent. Further, there is room for study and investigation into the Jain concept of entities of the universe according to Jain scriptures. A detailed objective study of the Jain scriptures might bring some more agreement between Jainism and modern science.