International Journal of Humanities Social Science and Management (IJHSSM)
Volume 4, Issue 4, Jul.-Aug., 2024, pp: 701-703 www.ijhssm.org

Comparing Vaiśeṣika Atomism with Modern Atomic Theory

JOYDIP MAHATO
RESEARCH SCHOLAR
PONDICHERRY UNIVERSITY

Date of Submission: 14-07-2024 Date of Acceptance: 30-07-2024

Abstract
This paper compares Vaiśeṣika's atomistic theories with those propounded by modern science, taking into consideration their conceptual framework, methodology, and philosophical implications. Vaiśeṣika conceived the universe as being composed of eternal, indivisible atoms having differential qualities. Drawing a comparison with this sort of atomism, contemporary atomic theory explains atoms through the subatomic particles that make up atoms, which in turn are governed by quantum mechanics: the proton, neutron, and electron. While Vaiśeṣika's approach to integrating metaphysical categories with logical reasoning finds its counterpart in modern science through empirical research and mathematical modelling, the comparison brings to light, on the one hand, the real foresight of Vaiśeṣika atomism that helped prefigure a few basic aspects of the modern theory of the atom and, on the other hand, the progress accomplished by contemporary science in explaining more plausibly and with greater empirical support the ultimate nature of matter. It epitomizes how atomistic thinking progressed from philosophical speculation to scientific experiments, reflecting a continued quest for an understanding of the basic nature of reality.

Keywords
Vaiśeṣika philosophy, Atomism, Maharsi Kaṇāda, Modern atomic theory, Ancient Indian philosophy, Comparative analysis

I. Introduction

Atomism, that is, the philosophy and science that matter is composed of indivisible particles called atoms. One of the oldest and most elaborate formulations of atomism is found in the Vaiśeṣika philosophy, one of the oldest Indian systems established by the sage Maharsi Kaṇāda about the 2nd century BCE. This is an early atomistic theory, quite contrary to the modern atomic theory, built through scientific contributions of numerous physicists and chemists from the beginning of the 19th century up until now. In this paper, the exposition on Vaiśeṣika atomism is contrasted with that of modern atomic theory, considering their similarities, differences, and philosophical implications.

1.Historical Context

1.1.Vaiśeṣika Philosophy

Another classical school of Indian philosophy, Vaiśeṣika, is characterized by a systematic approach to investigating the natural world. Founded by Maharsi Kaṇāda, the view in which it is firmly based is that the universe consists of some fundamental particles called atoms. The Vaishesika system, as propounded in the Vaiśeṣika Sūtra of Kaṇāda, provides for a universal understanding of reality through a scheme of nine substances: material elements and nonmaterial entities.

The Vaiśeṣika Sūtra consists of several books, each of which considers different aspects of reality. The first book introduces the main categories to be understood: substance, quality, action, universal, particular, inherence, and non-being. These categories are the cornerstones of Vaiśeṣika's metaphysical and physical comprehension of the world. Atomism is an integral part of the philosophy, finding its expression in the notion that all matter is reducible to indivisible particles that combine into complex structures.

1.2.Modern Atomic Theory

Modern atomic theory evolved from the Scientific Revolution of the 17th and 18th centuries and was worked on by scientists such as John Dalton, J.J. Thomson, Ernest Rutherford, Niels Bohr, and the list continues. Dalton's atomic theory, formulated at the beginning of the 19th century, explained that matter is composed of indivisible atoms that, in fixed ratios, combine to form compounds. This theory laid the ground for our understanding of chemical reactions and stoichiometry.

It was only after the discovery of the electron by Thomson in 1897, Rutherford's nuclear model of the atom in 1911, and Bohr's model on electron orbits in 1913 that knowledge regarding the structure of atoms was drastically developed.

International Journal of Humanities Social Science and Management (IJHSSM)
Volume 4, Issue 4, Jul.-Aug., 2024, pp: 701-703 www.ijhssm.org

Afterwards, during the 20th century, came the development of quantum mechanics, which described atoms and subatomic particles even better. Today, atomic theory forms an integral part of the Standard Model of particle physics that defines the basic building blocks of nature and their interactions.

2.Nature of Atoms

2.1.Vaiśeṣika Philosophy

According to Vaiśeṣika, atoms are eternal, indivisible, and imperceptible particles and are the basic constituents of matter. Vaiśeṣika identifies four types of atoms: earth, water, fire, and air atoms. With every type of atom, there exist some special qualities: the quality of smell in earth atoms, taste in water atoms, color in fire atoms, and touch in air atoms. These attributes correspond to the perceptible qualities of the material world.

The Vaiśeṣika view is that atoms combine to form composite objects, some perceptible, and some imperceptible. In the example, juxtaposition of atoms gives rise to a physical object, and separation, dissolution. Vaiśeṣika provided a category for non-being or abhāva, although not regarded as a substantive entity but an absence.

2.2.Modern Science

Modern atomic theory describes atoms as containing subatomic particles: protons, neutrons, and electrons. By modern definition, an atom is characterized by an atomic number that defines the number of protons in the central unit called the nucleus. The electrons circulate around this central entity—in probability-permitted cloudlike distributions, not in definite orbits. These are described by quantum mechanics. The modern concepts of the atom deal with complex interactions between subatomic particles that involve quantum states and wave-particle duality.

The Standard Model of particle physics further breaks down matter into more basic particles like quarks (making up protons and neutrons) and leptons (such as electrons). These particles are then bonded together by fundamental energies: gravitational, electromagnetic, weak nuclear, and strong nuclear forces. In contrast to the indivisible atoms of Vaiśeṣika theory, atomic theory now recognizes that atoms are composed of other particles, too, whose relations with each other are taken to be indeterminate and quantum.

3.Combination and Interaction

3.1.Vaiśeṣika Philosophy

According to Vaiśeṣika philosophy, atoms form composite objects through different mechanisms of combination. There are three types of conjunction: contact caused by motion, conjunction caused by the simultaneous motion of atoms, and actual junction. All these combinations give rise to various kinds of substances and objects. Disjunction is the separation of atoms from each other, whereby composite entities dissolve.

Vaiśeṣika further postulates that atoms combine and interact by "peculiar dharma" or unseen forces. The idea is more in keeping with the notion of intrinsic principles governing the behavior of atoms, even though they are not directly observable.

3.2.Modern Science

Modern atomic theory explains atomic combinations based on the principles of chemical bonding. Atoms share or transfer electrons with other atoms to form different types of chemical bonds and thus form molecules: ionic bonds, where electrons are transferred; covalent bonds, where they are shared; and metallic bonds, in which there is a 'sea of electrons.' Chemical reactions involve the formation and breaking of these bonds and lie at the heart of chemical change, which is understood in terms of both thermodynamics and kinetics.

Quantum mechanics deals in some detail with how electrons behave in atoms, including describing individual electron orbitals and the probability of a given electron's being in a specific position. Though Vaiśeṣika also provided a more abstract description of conjunction and disjunction, modern science grounds itself in empirical observation and mathematical modeling when it explains atomic interactions and chemical processes.

4.Comparison with Other Systems

4.1.Vaiśeṣika vs. Greek Atomism

On the other hand, Greek atomism, with philosophers like Leucippus and Democritus, developed it, considering atoms as the basic units of matter. In this sense, Greek atomism deals only with quantitative differences in atomic size and shape in that matter is made up of indivisible particles, where atoms differ from one another only in their physical dimensions.

Vaiśeṣika atomism includes atoms differentiated both qualitatively and quantitatively. For example, Vaiśeṣika identifies atoms with perceptual qualities—smell, taste, color, and touch—lacking in Greek atomism. This qualitative difference brings

out the greater finesse of Vaiśeṣika in the understanding of matter properties.

4.2.Vaiśeṣika vs. Jainism and Buddhism

Now, Jainism, a contemporary of Vaiśeṣika, does accept the atoms as indivisible and eternal. Still, it considers atoms only qualitatively homogeneous. These qualitative differences arise only from differences in combination and properties. Thus, the Jain view lays emphasis on uniformity in atoms, quite contrary to qualitative differentiation in the atomism of Vaiśeṣika.

Atoms are also acknowledged to exist by Buddhism, particularly by the Hinayāna tradition. In some Buddhist schools, atoms have been reinterpreted not as material particles but as dynamic forces or energies. This is thus in marked contrast with Vaiśeṣika's conception of atoms as static, indivisible units. In Buddhist atomism, atoms are momentary and imperceptible, with some sects describing them as aggregates rather than discrete particles.

5.Philosophical Implications

5.1.Vaiśeṣika Philosophy

Vaiśeṣika atomism is located within a much wider metaphysical scheme that includes categories of substance, quality, and action. The whole system represents one of the early endeavors to depict the basic nature of reality and its constituents. The approach of the Vaiśeṣika unifies both physical and abstract entities and supplies a complete view of the universe encompassing material and metaphysical parameters.

For the Vaiśeṣika system, the idea of eternal, indivisible atoms and how such atoms make up composite objects showed an advanced understanding of matter at that time. But it contrasts with empirical methodology and abstract metaphysical categorization according to which the philosophy was developed.

5.2.Modern Science

It is based on empirical research and mathematical modeling, which marks the shift from mere philosophical speculation to scientific experimentation. Developments in quantum mechanics and the Standard Model of particle physics have fostered a very elaborate and realistic understanding of matter. This approach tends to be focused on observable phenomena, experimental verification, and theoretical models that try to define the behavior of subatomic particles.

Whereas modern science is empirical in nature, the Vaiśeṣika philosophy represents an abstract metaphysical framework. Although Vaiśeṣika's theories of atoms prefigured some elements of atomic theory, contemporary science has a far fuller and more fully evidenced grasp of matter.

II. Conclusion

Vaiśeṣika atomism is probably one of the earliest and most sophisticated formulations of atomistic thought. Detailed descriptions of atoms as eternal, indivisible particles that combine to form complex objects parallel, to some respect, modern atomic theory. Other than in contemporary science, which is empirical and quantitative, the approach of the Vaiśeṣika system was metaphysical and qualitative.

For the most part, modern atomic theory is built through centuries of scientific research that goes on to give a better and more evidence-based understanding of matter. The development from Vaiśeṣika's philosophical atomism to the modern scientific theories presents the continuous quest for understanding regarding the basic nature of reality. Both Vaiśeṣika philosophy and modern science have valuable insights to give about atoms and their role in the universe, reflecting the rich interplay between philosophical and scientific exploration.

Reference

[1]. Dalela, Ashish. Semantic Automism - A Scientific Commentary on Vaisesika Philosophy. Shabda Press, 2021.
[2]. Doyaārī, Mṛṇālakānti, and Piyuṣakānti Māiti. Prārambhika Padārthavidyā. Scholar Books, 2011.
[3]. Kanada. The Vaiśeṣika Sūtrās of Kanada. Translated by Nandalal Sinha, Sacred Books of the Hindus, Vol. 6, The Panini Office, 1923.
[4]. Kumar, ShashiPrabha. Categories, Creation and Cognition In Vaisesika Philosophy. Springer, 2019.
[5]. Kumāra, Ḍāṃ. Śaśiprabhā. Vaiśeṣika Darśana Meṃ Padārtha-Nirūpaṇa. Rastriya Sanskrit Sansthan, 2013.
[6]. Mallik, Dr. Jhumur. The Vaisesika Theory of Knowledge. Maha Bodhi Book Agency, 2017.
[7]. Mukhopadhyay, Dr. Jaganath, and Sri Krishnapada Gangopadhyay. Prākṛtika Vijñāna Paricaya. Prāntika, 2001.
[8]. Yerāvāra, Prabodha. Sacitra Padārtha-Vijñāna. Caukhambā Subhāratī Prakāśana, 2022.