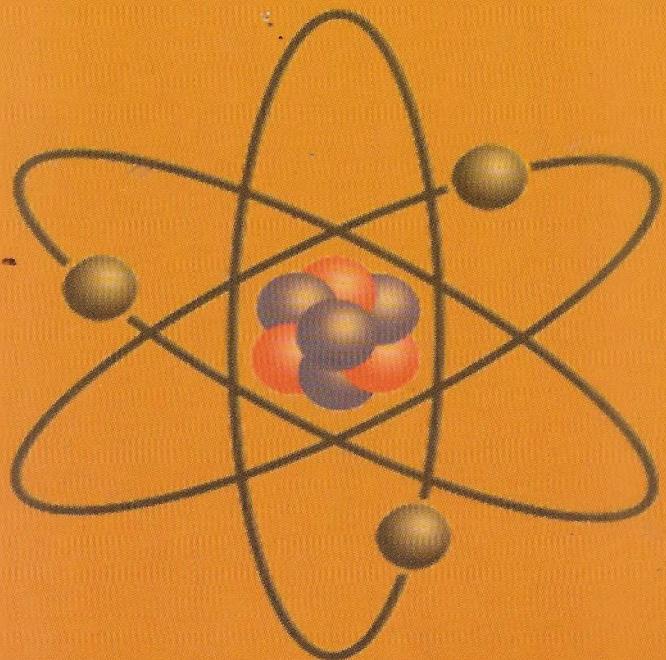


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THE PHYSICS OF VAIŚEṢIKA



Translation & Commentary by
Dr. C.S.R. Prabhu



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Tirupati
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(Sponsored by T.T.D.Recognized by U.G.C)
Alipiri - Chandragiri By-Pass Road,
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FOREWORD

The system of *Vaiśeṣika* is considered as one among the major six philosophies of ancient India. The *Vaiśeṣika* system propounded by sage Kanāda is called *Padārthaśāstra* as it deals with material entities. Kanada holds that by knowing the characteristics of the entities one will attain the Liberation. The *Vaiśeṣika* system deals with Physical world. The *Nyāya* system deals with means of valid knowledge. The scholars understand *Nyāya* and *Vaiśeṣika* systems as identical ones. But they are different in many respects. The *Vaiśeṣika* system deals with the establishment of *Īśvara* by inference, explanation about *Dharma* & *Adharma*, the necessity of *Samavāya*, *Viśesa* and other entities like *Śabda* in contrast to *Nyāyaśāstra*.

Prof. C.S.R. Prabhu, a renowned scientist, known for his critical analysis has written this monograph to establish that the *Vaiśeṣikadarśana* is the science of Physics. He does not accept *Nyāya* is identical to *Vaiśeṣika* system. He has rendered commentaries to *Vaiśeṣikasūtras* in this text.

I am happy to bring forward this work by S.V.Vedic University which is an admixture of traditional and modern studies.

I strongly believe that this work is a bridge between the traditional and modern knowledge.

I congratulate Dr. C.S.R. Prabhu for taking up on this kind of work and I wish him to continue to work on many of such philosophical texts.

I specially appreciate the team of scholars of Research & Publications who are involved in bringing this book in this form.

**Tirupati
Dt.16.09.2014**

**Prof. K.E.Devanathan
Vice-Chancellor**

***** *** *** *****

FOREWORD

Subhash Kak

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It is with great pleasure that I am writing this foreword to C.S.R. Prabhu's *The Physics of Vaiśeṣika*. It consists of the translation of Kanāda's sūtras together with a commentary. This book fulfills the great need since the *Vaiśeṣika*, which represents the earliest physics, is not well known to the Indian scientific community. The *Vaiśeṣika* is a starting point that is somewhat different from Western physics in as much that it includes the observer in the framework.

In the Indian tradition, the six Darśanas are the cognitive windows through which one perceives reality. Of these, two are atomic perspectives of logic (Nyāya) and matter (Vaiśeṣika); a further two are analysis and synthesis of creation at the physical (Sāṅkhya) and psychological levels (Yoga); and the last two are analysis of lived life (Mīmāṃsā) and the cosmos (Vedānta).

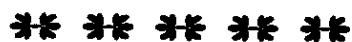
The *Vaiśeṣika* defines seven categories of experience: substance, quality, action, universality, particularity, relation, and nonexistence. Each atom in the *Vaiśeṣika* possesses size and mass and is distinct from every other atom. Atoms can vibrate in groups

and form dyads, triads and so on, until the combinations reach a diameter of one-millionth of an inch, at which state the substances can be identified as earth, or air, or fire, or water. The atom is point-like, for it could be sub-divided otherwise.

The Vaiśeṣika has categories not only for space-time-matter but also for attributes related to perception of matter. It starts with six nameable and knowable categories (Padārthas). The categories are: Dravya (substance), Guna (quality), Karma (motion), Sāmānya (Universal), Viśesa (particularity), and Samavāya (inherence). The first three of these have objective existence and the last three are a product of abstraction and intellectual discrimination.

The Universals (Sāmānya) are recurrent generic properties in substances, qualities, and motions. The particularities (Viśesa) reside exclusively in the eternal, non-composite substances, that is, in the individual atoms, souls, and minds, and in the unitary substances ether, space, and time. Samavāya is the relationship between entities that exist at the same time. It is the binding amongst categories that makes it possible for us to synthesize our experience.

The mind associates the non-substance categories with the substance. By doing so, it makes the observer central to the scheme. If there were no sentient beings in the universe then there would be no need for these categories.



Introduction

Vaiśeṣika of Kanāda, one of the six schools of Indian philosophical thought (the other five being Sāṅkhya, Yoga, Nyāya, Pūrvamīmāṃsā and Uttaramīmāṃsā or Vedānta), concerns itself with the Physical Reality. It deals with the characteristics of the physical entities, their properties, their interactions, including forces and motions of various types. Vaiśeṣika is called Padārthaśāstra or the Science of substances or material entities. It concerns itself with the modelling of the physical world in terms of its own laws of - fundamental physical entities, physical behaviour, finally culminating in the Atomic theory of the Universe. As basic Physics, Vaiśeṣika formed the foundation of ancient applied sciences as Āyurveda (Medicine) and Śilpaśāstra (Engineering).

Modern Science or Western Science, originating in Europe during 17th Century comprises many branches. Among the large number of branches of Science, Physics is commonly identified as the most exact. Physics is the study of the physical world, in all its forms and manifestations. Physics depends largely on Mathematics, as a tool for analysis. The quantitative aspects of the physical world are expressed in mathematical form - thereby enabling Physics to describe the physical phenomena in the most exact manner. Thus, Physics is the most exact of all the sciences.

Physics deals with the most fundamental entities of the physical world - Matter, Energy, Space and Time. All the

sciences concern themselves with the physical world, whose building blocks (e.g. molecules, atoms, particles) are the subject of Physics. Thus, Physics is the most fundamental and exact of all sciences in the modern times. Physics has two parts: the Classical Physics and the Modern Physics. In the present context we are largely focusing only on the Classical Physics, on historical grounds.

While the Vedas contained knowledge of all subjects, Vaiśeṣika is the branch of knowledge (Veda) corresponding to the physical world in the ancient times. Vaiśeṣikadarśana is the oldest known text of a science which deals with physical world - in other words "Physics". Physics is the science of the physical world of the modern times and Vaiśeṣikadarśana is the science of the physical world of the ancient times. Both Physics and Vaiśeṣikadarśana have a single common interest i.e., the physical world. The constituent entities of the physical world, their qualitiae (or properties) and their interactions (including force and motion) - these are the subjects common to Physics on one hand and the Vaiśeṣikadarśana on the other. The title of the book "The Physics of Vaiśeṣika" indicates that this book concerns itself with those aspects of Vaiśeṣika system, which are concerned with the science of the physical world i.e., Physics.

As the first step in the development of any science is the identification of fundamental categories, Vaiśeṣikasūtras of Kanāda model the Physical Reality in terms of six fundamental categories of substances or entities: (1) Dravyas

(physical substances in their atomic form); (2) Gunas (their properties) and (3) Karma (Motion) along with associated fundamental abstractions of (4) Sāmānya (generalization); (5) Viśesa (specialization) and (6) Samavāya (Inherence) (though later scholars enhanced upto 7 or even 10 categories).

Thus, "The Physics of Vaiśeṣika" brings out the Physics in Vaiśeṣikadarśana. Among 10 chapters of the Vaiśeṣikadarśana only the first five, which are dealing with the subject of interest to Physics are covered in this book (in the fifth chapter we stop at a point where the discussions relating to the phenomena of the physical world end).

In five chapters, Vaiśeṣika's view of the physical world is brought out clearly. It comprises the fundamental entities (Matter, Energy, Space and Time), their interactions through various forces (gravitation, electricity, magnetism, etc.), various types of motion in various states of matter. Vaiśeṣika models the physical world in terms of the eternal atoms as the ultimate building blocks of the Universe - Atomic theory which continued till 18th century.

While historians of science were generally unaware of the contribution of ancient India to Physics, historically Vaiśeṣika was merged, quite unfairly, with Nyāya (or Logic). While it is true that they both together have a lot in common, Vaiśeṣika, the science of the physical world or Physics itself of the ancient world, had its own independent and exclusive status, which had been sometimes denied by the logicians (especially of the middle ages). While Nyāya concerns itself

with epistemology or the earls of acquisition of valid knowledge, Vaiśeṣika concerns itself with the ontological aspects—the constituents of the Universe itself. Sāṅkhya also deals with the fundamental categories (as they arise in the space of mind) and therefore has some correspondence with Vaiśeṣika (in the physical world).

While the Vaiśeṣikasūtras of Kanāda are of very great antiquity of a period of very remote time (belonging to post Vedic but Pre-Puranic age), what is usually known as the "sūtra Period", its extant commentaries belong to a period of recent origin (in the last two thousands of years only). Even though the time period of Kanāda's Vaiśeṣikasūtras is not known with certainty, a Chinese tradition describes Kanāda being of great antiquity of atleast about a millennium before Buddha.

Unfortunately, the series of successive commentaries of the earlier periods are not available to us anymore. There was a large time interval between original Vaiśeṣikasūtras of Kanāda and the commentaries starting with Praśastapāda (estimated 5th Century A.D.) (Who also had names as Praśasta Mati, Praśasta Deva, Praśastakara Deva, etc.). While we lost most of the early commentaries (including one "Katandi", one Vṛtti by Bharadwaja and one commentary by Ravana), the earliest text we have with us today is Praśastapāda's own text known as "Padārtha Dharmā Saṅgrahah".

This text is not exactly a commentary to the Vaiśeṣikasūtras of Kanāda, but it has its own independent status as a

respectable text on Vaiśeṣika (with significant amount of Purāṇic orientation and related content). Praśastapāda also wrote a different text, which was the actual commentary to the Vaiśeṣikasūtras (known as Bhāṣya, Vākyā or Tīkā), which is not available today), to us. Therefore, we are forced to depend upon the existing text "Padārtha Dharma Saṅgrahah".

After Praśastapāda, the commentaries on Vaiśeṣika are found from the more recent periods of time (within one thousand years). "Kiranāvalī" of King Udayana (11th Century A.D.) is a commentary on Praśastapāda's work. "Upaskāra" of Sankara Mishra (early 15th Century A.D.) is a commentary on Vaiśeṣikasūtras with a heavy dependence on Praśastapāda.

Atreya wrote a Bhāṣya to Vaiśeṣikasūtras, where the critique was given by Vādirāja. Most, if not all the works and even references to Vaiśeṣika are traceable to scholars of Nyāya, prominent of them being Prabhākara, Bhaṭṭa Jayadatta, Annambhaṭṭa, Mallavadin, Murārimiśra, Chakradhara, Simha Sun, Śrīvallabha, Raghunātha, Raghurāma, Jayarāma, Venidatta and Udyotakara. Some of them had access to some of the lost ancient commentaries such as "Katandi" and "Vākyā". For example, Udayana refers in his "Kiranāvalī" to a Vaiśeṣikabhāṣya as being very extensive and the same is ascribed to Ravana by Padmanabha Misra (16th century) in his "Kiranāvalī-bhāṣya".

None of the commentaries, post Praśastapāda, attempted a Physics based interpretation of the Vaiśeṣikasūtras, as they were too clouded and dominated by the Nyāya Logic. Praśasta-

pāda, who is the oldest of the commentators available today, is held with high regard as the first known commentator (next to Bharadwaja and Ravana) whose work "Padārtha Dharma Saṅgrahah" is available and is considered as a standard reference text on Vaiśeṣika. "Daśapadārthaśāstra" of Chandramati was an ancient text of Vaiśeṣika and was also translated to Chinese by Hsuan Tsang during (648 AD).

Thus, the origins of Physics can be traced back to the Vaiśeṣikasūtras of Kanāda of very great antiquity of several millennia B.C. and also later to Padārtha Dharma Saṅgrahah of Praśastapāda (5th Century A.D.). All the other available commentaries are of more recent origin (a few centuries). "Upaskara" of Sankara Misra had its origin in second quarter of 15th century and "Setu" of Padmanabha Misra originated in 16th century A.D.). All these texts have been studied all through the history in the traditional academic curricula along with Nyāya/Logic. However, all of them belong to a time period several centuries before the modern advent of western science and the first formal discussions of Classical Physics in the west (18th century).

Unitary View of the Physical Reality

The Indian Philosophical models of the Physical Reality went much beyond the perspective of the Classical Physics.

Advaita, based on the Upaniṣads, presents a Unitary view of the Physical Reality. According to the Advaita, Brahman or the unknowable Absolute Reality is the essence of Existence whose apparent manifestation is the multifarious World, due

to Māya. In Quantum Mechanics, the nature of the physical world as expressed in Schrodinger's Wave Equation is described to be the expression of Māya as stated by Schrodinger himself.

The Relativity of Space and Time as expressed in Indian Philosophical system can be shown as a parallel thought to the Theory of Relativity of Einstein.

The Classical Physics model of four fundamental entities Matter, Energy, Space and Time gets fundamentally transformed in the Modern Physics. In the context of the Relativity Theory, Space and Time do not have absolute existence - they are relative to the Observer. When the Observer travels at velocity of Light, both Space and Time become "0" (Zero). Thus, they do not have absolute existence. Thus, we have to reduce the four absolute fundamental entities to only two: Matter and Energy.

Matter and Energy were considered independent in Classical Physics but became interconvertible and philosophically single in Modern Physics in Relativity Theory with the famous equation of Einstein: $E = mc^2$. This equation demonstrates the Unitary and interconvertible nature of Matter and Energy. Thus, when we ask the question: What is the final one single fundamental Absolute Reality?

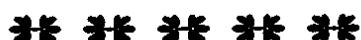
The answer could be: One which becomes many with all forms of Matter or all forms of Energy. This One was explained as Brahman in Advaitavedānta of Upaniṣads. The Parallelism between One Brahman of Upaniṣads which manifests as Universe and One Absolute Reality which manifests as

all forms of Matter and all forms of Energy in Universe cannot be missed! In a way the same Truth is expressed by both Schools of Thought, Advaita and Modern Physics.

In Vaiśeṣikasūtras of Kanāda, this Unity comes out as "Sat" (equivalent to Brahman of Vedānta) which is the Essence of all Existence (in atomic form) and knowing and understanding that one "Sat" results in Liberation or Mokṣa or Niśśreyasa. The Observer of Modern Physics was identified as Atman or Self in Vaiśeṣika.

In this book an attempt has been made to unearth and demonstrate the evidence of the awareness and knowledge of the basic principles of Physics, including Atomic theory, in the Vaiśeṣikasūtras of Kanāda, whose antiquity is unassailable and is well known to have large precedence over the western sources of Physics, including the recent sources (18th century) and also the ancient Greek sources (4th century B.C.)

It is hoped that this endeavour will enable a better assessment and appreciation of the hallowed tradition of ancient Indian Science.





THE PHYSICS OF VAIŚEṢIKA

** * * * *

Chapter -I, Part - I

अथातो धर्मं व्याख्यास्यामः ॥ १ ॥

अतः = For this reason, अथ = Then now, धर्मम् = Dharma,
व्याख्यास्यामः = We shall comment upon.

Now, for this reason, we shall comment upon Dharma.

Dharma is the goal of the entire human life, civilization, culture and literature. Mahābhārata is known to be a Śāstra of Dharma. There are also many well known Dharmaśāstras e.g. Manu Dharmaśāstra.

Dharma can be multifariously defined and described. Originating from the verb root "Dhri" which means to "hold", Dharma stands for Universal Law, Universal Virtue, which holds up this Universe. The Universe is held up due to the Universal Laws - The Laws of Nature, including the Laws of Physics, which is the present subject context in Vaiśeṣikadarśana. The Laws of Physics are being described in Vaiśeṣikadarśana.

In the context of Physics, Dharma can be interpreted as the body of rules and laws which determine the behavior of the physical world, with all its constituents: all forms of Matter, Energy, Space, Time, and forces such as Gravitation, Electrostatic forces etc.

यतोऽभ्युदयनिःश्रेयससिद्धिः स धर्मः॥ २॥

स धर्मः = Dharma is that, यतः = from which, अभ्युदय = progress (material progress, economic development, and wealth creation), निश्रेयस = Moksha (or the liberation or emancipation or nirvana) of the individual and society, also known as the highest good, सिद्धिः = is achieved.

Dharma is that from which progress and liberation (highest good) is achieved.

Dharma can be understood from a variety of perspectives: legal, social, moral, religious, individual, universal and also purely from the physical perspective.

In the context of Vaiśeṣika, the physical perspective may also be considered - the laws on which the Physical world or the physical reality operates can be termed as Dharma of the Physical world. In other words, the science of Physics can be considered as the Dharma of the physical world. Evidently the knowledge of the laws of the physical world, that is, Physics, can lead to material progress (by means of the application to technology which can result in material progress and economic development). It should also lead to निःश्रेयस or the highest good, which is the spiritual enlightenment of the individual and the society, without which plain material progress and wealth creation can lead to unhappy and immoral conditions such as social tensions, violence and terrorism, as is happening today. Thus, material progress, when combined with the social, moral and ethical progress, can lead to the highest good, which shall

lead to Mokṣa or Liberation, which is the total freedom and independence of the individual and the society (without which there is dependence and suffering) only such Dharma is essential, which can result both in material progress and spiritual enlightenment. This is the import of this Sūtra.

तद्वचनादाम्नायस्य प्रामाण्यम् ॥ ३ ॥

तत् = that (Dharma as referred in previous sutra), **वचनात्** = from the word, **प्रामाण्यम्** = reference (standard), **आम्नायस्य** = of the Veda.

The Veda acquires Prāmāṇya (or the position being Pramāṇa) or standard reference by virtue of it being the word of Dharma.

Veda proclaims Dharma; Thus Veda becomes the Pramāṇa or Standard reference of knowledge. i.e. the Veda becomes the standard, by virtue of being the 'word of that'. 'That' is explained by some commentators as the word of God. Authoritativeness or Prāmāṇya comes from the word of God, which is Dharma.

Even though God or Īśvara is not directly referred in the Vaiśeṣikasūtra, some of the commentators have interpreted तत् in this sūtra as being a reference to God - to describe the Veda (आम्नाय) as the word of God. The word of God. The word तत् 'that' refers to the cause by which the (आम्नाय) becomes standard (Prāmāṇya). The Nyāyadarśana of Gautama, a close associate text of the Vaiśeṣika, refers explicitly to the existence of the God. On the grounds of

close affiliation between Nyāya and Vaiśeṣika it is justified by some commentators that God is accepted by Vaiśeṣika, in this sūtra.

While taking the Veda as the standard reference of Dharma, which is the Universal Law, the Veda becomes the standard of reference of science as Science is only a standard reference of Universal Laws or Dharma, of the physical world.

All the major commentators of Vaiśeṣika as Praśastapāda have theistic orientation and have clearly ascribed God's will as the cause of Creation and Dissolution of the Universe.

In conclusion it may be stated that while Kanāda has not explicitly referred to God, it can be a possibility that he had belief in God's existence, as he has explicitly declared his affiliation to the supreme authority of the Veda, which is an indirect acceptance of God, as the Veda is very clearly theistic and proclaims the existence of God.

धर्मविशेषप्रसूतात् द्रव्यगुणकर्मसामान्यविशेषसमवायानां पदार्थनां
साधर्म्यवैधर्म्याभ्यां तत्त्वज्ञानात्रिःश्रेयसम् ॥ ४ ॥

धर्मविशेषप्रसूतात् = due to having born of the special qualities of Dharma, **तत्त्वज्ञानात्** = from the complete (exhaustive) and essential knowledge or the understanding of the, **सामन्यविशेष-** **समवायनाम्** = of the generalized, specialized, inherent, **साधर्म्य-** **वैधर्म्याभ्याम्** = similar and dissimilar (properties of), **पदार्थनाम्** = fundamental entities or fundamental substances comprising, **द्रव्य-** substances or material entities of fundamental nature i.e. the

fundamental constituents of the Physical world, गुण = properties or qualities, कर्म = motions, निःश्रेयसम् = the highest good can be achieved.

Having born out of the special qualities of Dharma (the Universal Law) (धर्मविशेषप्रसूतात्) the highest good (निःश्रेयस) can be achieved by the complete knowledge and (exhaustive) understanding (तत्त्वज्ञानात्) of the similar, dissimilar, general (सामान्य) specialized (विशेष) inherent (समवाय) (properties of) entities or substances, their qualities (or properties) and their different types of motion (द्रव्यगुणकर्म) pertaining to the fundamental entities or fundamental substances पदार्थ.

In this sūtra, Kanāda is indicating the outline of the exhaustive philosophical knowledge (तत्त्वज्ञान) of the physical world in terms of its constituent Padārthas made of substances, their qualities or properties and their motions of various types, of the similar and dissimilar, generalised and specialised (or general and particular) all of this knowledge leading to the highest good all born out of the special qualities of Dharma.

In other words, Kanāda is describing the details of Physics - physical entities their fundamental material constituents, their properties and their motions of different kinds- the knowledge of all of which is being stated to lead to the highest good निःश्रेयस.

The notion that the knowledge of the physical world (in terms of its constituent entities, their qualities and their motions) leads to the highest good is the greatest spirit of

science, ever demonstrated, anywhere (East or West) and any time in the history of Science and Technology.

Traditionally the six Padārthas or fundamental substances are known to be (1) Dravya (substance) (2) Guna (quality) (3) Karma (motion) (4) Sāmānya (generalisation or generality or universality) (5) Viśeṣa (specialisation or particularity) (6) Samavāya (inherence). Later one more was added i.e. Abhāva or Negation. We feel that "aggregation" can be added - as all entities in the world form aggregation hierarchy, in addition to generalisation and specialisation hierarchies.

In the next sūtra the details of each of these i.e. material entities and fundamental constituents are described. In subsequent sūtras the properties of material entities and also details of all varieties of motions are described.

पृथिव्यापस्तेजो वायुराकाशं कालो दिगात्मा मन
इति द्रव्याणि ॥ ५ ॥

पृथिवी = the element Prithivi, **आपः** = the element Apa, **तेजः** = the element Teja, **वायुः** = the element Vayu, **आकाशम्** = the element Akasa, **दिग्** = direction/space, **काल** = the Time, **मन** = the Mind, **आत्मा** = the Self these (above) are, **द्रव्याणि** = substances or fundamental elements of the Universe.

Prithivi, Apa, Teja, Vayu, Akasa, Direction / Space, Time, Mind and Self are the (nine) material entities or substances (of the physical world or Universe).

In our view these fundamental entities (Dravyas) are not just material alone. Each of the five elements namely

Pṛthivī, **Āpa**, **Teja**, **Vāyu** and **Ākāśa** are abstract notions or concepts (generalized and extendable) and parts of a broad framework (in Sanskrit called -'Tatwas') each of which has different physical manifestations in different contexts. For example **Pṛthivītattva** is not just 'Earth' or 'solid matter' alone, but much beyond. **Pṛthivī** has many other connotations - for example the sense of smell is associated with **Pṛthivī**. Thus the interpretation of **Pṛthivī** as 'solid matter' is true, in basic or general Physics. In other domains such as Ayurveda, it could mean much more. Similarly '**Āpatattva**' can be stated to be Water or liquid state of matter - but again, it could mean much more than that. The sense of taste is associated with **Āpa**. Similarly '**Vāyu**' is 'Air' or 'gaseous state of Matter' and much beyond. The sense of 'touch' is associated with '**Vāyu**'. **Vāyu** could mean much more in physiology, in terms of **Prāṇa** in Yoga and Ayurveda. **Prāṇa** the life force is defined to be the basis for all life and for all physiological functions in all living beings. **Prāṇa** is further classified as **Prāṇa**, **Apāna**, **Vyāna**, **Udāna** and **Samāna**, each of them performing specified functions in the bodies of living beings. Thus **Pṛthivī**, **Āpa** and **Vāyu** are abstract notions of the frame work of Tattvas, whose special cases of instances of occurrence can be stated to the solid, liquid and the gaseous state matter. These Tattvas go much beyond the states of matter. They form the philosophical or theoretical framework of the description of the physical world, whose special instances of occurrence

in the physical world are the three states of matter: liquid, solid and gas. In other words, in Vaiśeṣika an attempt is made to model the real world or Nature in terms of a highly generalized framework of Dravyas, whose special instances can be deduced for the purpose of utilization in a particular domain of discussion or a subject (such as Physics, Physiology, Yoga, Ayurveda etc.). In each of these domains, these three Tattvas have their specialized existence and the laws of those specific domains are applicable to them. In basic Physics, three Tattvas can be taken simply as solid, liquid and gaseous states of matter. Accordingly the laws of basic Physics apply on them (as explained in chapter 5). Similarly the laws of Physiology apply on these three Tattvas in the context of Ayurveda and Yoga. Similarly these three Tatwas assume different roles in other domains such as Engineering or Śilpaśāstra, Architecture or Vāstuśāstra. For example, Vāyu could be related to the dynamic functions in Engineering, relating to work and power.

The Vedic description of Pr̥thivī, Āpa, Vāyu as Devatas could be interpreted as a generalized description. The word Devata in the Veda could be interpreted as a 'subject' or Tattva, such as Pr̥thivī, Āpa and Vāyu as above.

Teja can be easily identified as the Universal Energy Principle, having multifarious forms as light, heat, electricity etc. This unity and identification of the Universal Energy Principle as Agni Devata in the Veda was clearly depicted in the Vedic hymns and also in the later literature.

In the Purāṇas the same Devatas of the Veda are personified (for example : 'Oh Agni! You are inside the womb of the plants, the trees, the elements, and the Universe and also in the womb of Āpa - गर्भोऽस्योषधीनां गर्भो वनस्पतीनां गर्भो विश्वस्य भूतस्याग्ने गर्भोऽपामसि ।

Ākāśa can be identified as the classical Ether, in which all the physical phenomena and all other Dravyas exist or reside. Ākāśa or Ether can be distinguished from Dik or Direction or Space, where the Cartesian space is meant (spatial reference framework). Ākāśa has the quality of Śabda or Signal (or vibration). Dik, on the otherhand, could be taken as Space, especially in view of the fact that the first definition of the Dik in Vaiśeṣika was given in terms of spatial or locational reference. Displacement could be identified as an attribute of Space, along with location.

Manas or Mind could be identified as an element or substance, along with Ātma or self as the sentient being, who is the Observer of all phenomena. Mind is essential to the self, to be able to perform observation. When there is no mind (e.g. deep sleep), no observation can be made by the self, even though the self is present. Self can be taken as Pure Consciousness, or the pure ability to be aware. Mind can be taken as the analytical ability, which is essential for making and recording any observations.

While in the classical (or Newtonian) physics the Observer was ignored (even though observation was essential), in Modern Physics the Observer was recognized as

very important and was identified as a critical requirement for all observations, since any observation was purely relative to the Observer. Even though Vaiśeṣika system deals with only Classical Physics (and not with Quantum or Relativistic Physics), the importance of the Observer was well recognized and the Observer was defined in two components: the Mind and the Self. The Self could be the actual Observer, but the Self has to have an active Mind, to be present, for performing any observations. This could be identified as a unique contribution of Vaiśeṣika (which was lacking in classical physics).

रूपरसगन्धस्पर्शाः सङ्ख्याः परिमाणानि पृथक्त्वं संयोगविभागौ परत्वापरत्वे बुद्धयः सुखदुःखे इच्छाद्वेषौ प्रयत्नाश्च, गुणाः ॥ ६ ॥

रूप = form/shape/colour, रस = taste, गन्ध = smell, स्पर्श = touch, संख्या = numbers and counting, परिमाणानि = various measures (length, area, volume, weight etc.), पृथक्त्वम् = being distinguished (to be separated), संयोग = conjunction or joining (or combination), विभाग = disjunction or disjoining (or division), परत्व = ‘being next’ (or spatially next or temporally later or subsequent), अपरत्व = ‘being previous’ (or spatially previous, or temporally previous or earlier), बुद्धयः = intellects (several), सुखम् = happiness, दुःखम् = sorrow, इच्छा = desire, द्वेष = hatred, च = and, प्रयत्नाः = efforts.

गुणाः these (17) are qualities or properties or attributes.

Form / Shape / Color, Taste, Smell, Touch, Numbers and counting, various Measures (length, area, volume, weight etc.), being distinguished (to be separated), conjunction or joining (or combination), disjunction or disjoining (or division), ‘being next’

(or spatially next or temporally later or subsequent), ‘being previous’ (or spatially previous, or temporally previous or earlier), intellects (several), happiness, sorrow, desire, hatred and effort these (17) are qualities (or properties).

The first 11 above are the qualities of physical substances or entities (द्रव्य) The last 6 are the qualities of the mind and self. The mind and self are also been considered as Dravyas or entities and they have qualities as mentioned above (the last 6 qualities). Prayatna (effort) is a quality of self while all the rest (5) are the qualities of mind.

The first 11 qualities mentioned above are well known as physical properties in Physics and Chemistry. For any material entity or substance these physical properties are essential. Conventionally in Physics and Chemistry every substance is examined for the same physical properties mentioned above. The quality of counting or numbering is fundamental for any material entity. The qualities of previousness and nextness are related to Space and Time also. The two complementary qualities of conjunction and disjunction are relevant to the context of interactions between entities (two or more entities or substances can be combined to form a new entity or alternatively an existing entity can be decomposed into several individual entities). These conjunctive and disjunctive interactions are very common in chemistry and also in Physics. In later chapters Kanāda describes various types of interactions, including the interactions of Atoms.

In addition to the above qualities seven more qualities are popular in the ancient physics. Praśastapāda has elaborated on these additional qualities which have been referred and discussed by Kanāda in later chapters. These are Gurutva (गुरुत्व) (having weight), Dravatva (द्रवत्व) (liquidity or viscosity), Sneha (स्नेह) (softness, stickiness or viscosity) Samskāra (संस्कार) (trait, habit or continuation of a function), Dharma (धर्म) and Adharma (अधर्म) (opposite of Dharma) and Śabda or Signal. These additional qualities (seven in addition to seventeen) were well known in the ancient scientific literature including the vast literature of Ayurveda and Yoga. The letter 'च' (and) at the end of the sūtra indicates that there are more qualities, otherwise well known. This has given rise to the identification of 8 additional qualities as above.

The packaging of specific qualities into one compound word indicates their closeness and membership of a specific class of qualities (form, smell, touch). The usage of plural for numbers and counting and also measures (परिमाणानि) indicates several of them - multiple numbers or numbering systems of different bases and multiple measures of multiple items (length, area, volume, weight etc.) Given the fact that several applied sciences such as Medicine (Ayurveda) and Engineering (Śilpaśāstra) use these measures and numbers with various units for various requirements, this statement in the plural can be well understood.

उत्क्षेपणमवक्षेपणमाकुञ्चनं प्रसारणं गमनमिति कर्माणि ॥ ७ ॥

उत्क्षेपणम् = throwing up or upward motion/thrust, अवक्षेपणम् = throwing down or downward motion, आकुञ्चनम् = contracting or pulling towards a point, प्रसारणम् = spreading or transmission or broadcast, गमनम् = motion (in general), इति = these are, कर्माणि = Karmas or types of Motion.

Throwing up or upward motion or thrust, throwing down or downward motion, contracting or pulling towards a point, spreading or transmission or broadcast and motion (in general) - these are various types of Karmas or types of Motion.

In this sūtra various types of Karma (Motion) are explained. Karma or action, which can be interpreted as motion, can be classified into five categories: upward motion, downward motion, contraction, expansion or spreading (also called broadcasting or transmission) and finally general motion. It is interesting to see that the definition of general motion (गमनम्) is being distinguished from other four specific categories of motion viz., upward motion, downward motion, contraction and expansion (or transmission / broadcasting). What does this mean? Logically motion is a generalized concept which can be modelled separately from specific categories of motion. This means that more categories of motion are possible to be identified. Praśastapāda has identified many more categories of motion as follows:

गमनग्रहणात् भ्रमणरेचनस्यन्दनोर्ध्वज्वलनतिर्यक्पतननमनोन्नमनादयः
गमनविशेषाः ।

While motion (गमनम्) can mean, in general, just about any type of motion, as defined in a given context. It thereby provides adequate flexibility to permit any type of motion, as a special case of general motion. Praśastapāda has identified on this basis, some well known additional categories of motion, which are universally observable and which are referred by Kanāda himself, in later sūtras of Vaiśeṣika: भ्रमण or circular motion, रेचन or gushing out or expulsion, स्पन्दन harmonic motion or beat (as in case of heart beat or हृदयस्पन्दन, ऊर्ध्वज्वलन upward burning (of flame), तिर्यक्पतन falling down, नमन bending forward, उत्तमन rising upward, आदयः etc., i.e. all other types of motion are गमनविशेषाः are special types of motion. He also stated न जात्यन्तराः not that these motions belong to a different class i.e. the motion such as rotation etc. mentioned above are only specialized categories of one single class of Karma, viz. गमन or motion, in general. This observation of Praśastapāda is significant, in the sense that it identified all types of other motions (rotation etc.) as observed in real life as simply sub categories of one class of motion that is गमन or simple motion and not to be taken as independent classes of Karma. In other words, Praśastapāda is interpreting that the word गमन in Kanāda's sūtra refers to motion in general and all types of observable moving phenomena such as rotation, gushing out, beat etc. are only special categories of the same गमन or motion in general (and not independent). This implies that Kanāda is explaining a generalized concept of Motion which is understood to

be the general principle behind all possible types of motions, ever observable in real life.

सदनित्यं द्रव्यवत्कार्यं कारणं सामान्यविशेषवदिति
द्रव्यगुणकर्मणामविशेषः ॥ ८ ॥

सत् = (having) Existence, **अनित्यम्** = (being) impermanent (temporary), **द्रव्यवत्कार्यम्** = (being) the result or Effect (of something which is a Cause), **कारणम्** = (being) the Cause (of something which is a result or effect), **सामान्य** = (being) generalized and, **विशेषवत्** = (being) specialized, **इति** = (all) these (above) are, **अविशेषः** = (all the properties) in general of, **द्रव्य** = (all) material entities or substances, **गुण** = (all) qualities or properties and, **कर्मणाम्** = (all) actions or motions.

Having existence, being impermanent (temporary), being the result or Effect (of something which is a Cause), being the Cause (of something which is a result or effect), being generalized and being specialized - all these above are the properties in general of material entities (or substances), qualities (or properties) and motions.

In this sūtra Kanāda is describing the properties of all (द्रव्य) material entities or substances, (गुण) qualities or properties and (कर्म) motions. These general properties are: having existence, being impermanent (temporary), being the cause, and being the effect, being generalized and being specialized (having class hierarchy).

Praśastapāda adds two more qualities for definition, in addition to the above: अभिधेयत्व and ज्ञेयत्व i.e. naming (them),

knowing (them) i.e. being identified with a name and also being known. Evidently any specific material entity or substance, its quality or motion should be identifiable and knowable. This is a good extension of the intent and purport of this sūtra by Praśastapāda. Praśastapāda also elaborates in detail on class hierarchy in terms of सामान्य generalized and विशेष specialized categories.

द्रव्यगुणयोः सजातीयारम्भकत्वं साधर्म्यम् ॥ ९॥

द्रव्यगुणयोः = Of (for) the (two) material entities (or substances) and qualities (or properties), **सजातीयारम्भकत्वम्** = the ability to initiate or create entities and qualities of their own class, **साधर्म्यम्** = is common.

Of (for) the (two) material entities (or substances) and qualities (or properties) the ability to initiate or create entities and qualities of their own class is common.

Both material entities or substances and qualities have the property (or ability) to create (or initiate) other material entities (or substances) and other qualities of their own respective classes. In other words material entities or substances have the capability to produce or create new material entities of their own class or type. Similarly, qualities (or properties) are capable of producing or creating new qualities (or properties) of their own class or type.

This is a good generalization that new materials or substances can be produced by the existing materials or substances of the same class. Similarly new qualities can be produced by existing qualities of the same class. This is

well understood in Physics and Chemistry in the context of production of new materials with new properties, as per the previous materials and their properties. However, dissimilar combinations of materials and properties can also produce new materials and properties as indicated in the next sūtra.

द्रव्याणि द्रव्यान्तरमारभन्ते गुणाश्च गुणान्तरम् ॥ १० ॥

द्रव्याणि = material entities (or substances), **आरभन्ते** = create (or produce) or initiate, **द्रव्यान्तरम्** = other material entities (or substances) of classes other than their own own, **च** = and, **गुणाः** = qualities (or properties), (**आरभन्ते**) create (or produce) or initiate, **गुणान्तरम्** = other qualities (or properties) of class other than their own.

Material entities (or substances) create (or produce) or initiate other material entities (or substances) of classes other than their own and qualities (or properties) create (or produce) or initiate other qualities (or properties) of class other than their own.

Material entities (or substances) can create (or produce) material entities (or substances) of class other than their own also. Similarly qualities (or properties) can cause (or create) other qualities (or properties) of other their own also. This comment is to extend to previous sūtra to state that it is possible to create material entities and qualities of classes other than their own, in addition to those of their own class.

कर्म कर्मसाध्यं न विद्यते ॥ ११ ॥

कर्म = motion, **न** = does not, **विद्यते** = exist(s), **कर्मसाध्यम्** = (which) can be caused by (another) motion.

Motion does not exist (which) can be caused by (another) motion.

One motion cannot be caused by another motion alone, without the material entity (or substance) and its qualities. Motion requires a cause which has to have some material entity (or substance) along with its qualities.

LAW OF CONSERVATION OF MATTER

न द्रव्यं कार्यं कारणञ्च वधति ॥ १२ ॥

न = no, द्रव्यम् = material entity (or substance), वधति = destroys (or kills) its own, कार्यम् = effect, च = and, कारणम् = cause.

No material entity (or substance) destroys (or kills) its own effect and cause.

No material entity (or substance) can destroy its own cause or its effect. In other words material entity (or substance) is conserved. "This is law of conservation of matter." A substance cannot be the cause of its own destruction. Some other cause should exist.

उभयथा गुणाः ॥ १३ ॥

गुणाः = qualities (or properties) are, उभयथा: = both ways.

Qualities (or properties) are both ways

But the qualities (or properties) can destroy the Cause and Effects of the qualities (or properties). While in the previous sūtra the law of conservation of matter is stated, in this sūtra it is stated that the same is not applicable for qualities (or properties) In other words the law of conser-

vation does not apply to qualities (or properties) - it applies only to matter.

IMPOSSIBILITY OF PERPETUAL MOTION

कार्यविरोधि कर्म ॥ १४ ॥

कर्म = motion is, कार्यविरोधि = the enemy (or opponent) of motion.

Motion is the enemy (or opponent) of motion.

Motion is the enemy of its own effects of motion. Motion destroys motion. In other words motion will halt when it is executed i.e. after motion is completed, there is a complete halt i.e. the body will come to stand still. It is being stated here that any motion will come to an end i.e. perpetual motion is not possible. (This could be interpreted to be referring to knowledge of 'friction', not permitting perpetual motion).

PROPERTIES OF SUBSTANCE

क्रियागुणवत् समवायिकारणमिति द्रव्यलक्षणम् ॥ १५ ॥

द्रव्यलक्षणम् = the characteristics of Dravya (material entity or substance) are to be, **क्रियागुणवत्** = having motion and having qualities, **समवायिकारणम्** = being the cause of (or with) inherence (of qualities and motions), **इति** = these (above)

The characteristics of Dravya (material entity or substance) are to be having motion and having qualities and being the cause of inherence (of qualities and motions). (or being a cause with inherent and motions qualities).

Properties of substance are being defined here. A substance has a basic characteristic of inherence of motion and qualities. A substance has an inherent characteristic of having some qualities and having some motions.

समवायसम्बन्ध - or Inherence Relation is a relation in Logic (न्यायशास्त्र) where a certain substance has certain inherent characteristics, such as qualities as heat and motions such as rotary motion. The characteristics of any general substance are to have (i) motion and (ii) qualities. This is possible only due to 'Inherence' relation. Therefore Inherence is very important.

PROPERTIES OF A QUALITY

द्रव्याश्रयगुणवान् संयोगविभागेष्वकारणमनपेक्ष

इति गुणलक्षणम् ॥ १६ ॥

गुणलक्षणम् = the characteristics of quality are, द्रव्याश्रयगुणवान् = being dependent on material entities (or substances), संयोग-विभागेष्वकारणमनपेक्ष = being not a cause of conjunction and disjunction, इति = these (above).

The characteristics of quality are - being dependent on material entities (or substances) and being not a cause of conjunction and disjunction.

Now the characteristics of a quality are being described. A quality has to be dependent on a material entity (or substance) and it is not a cause of either conjunction or disjunction of material entities.

PROPERTIES OF MOTION

एकद्रव्यमगुणं संयोगविभागेष्वनपेक्षकारणमिति

कर्मलक्षणम् ॥ १७ ॥

कर्मलक्षणम् = the characteristics of motion are - एकद्रव्यम् = to be belonging to only one material entity (or substance), अगुणम् = having no quality, अनपेक्षकारणम् = being the unaffected cause, संयोगविभागेषु = (both) in conjunction and disjunction, इति = these (above).

The characteristics of motion are - to be belonging to only one material entity (or substance), having no quality, being unaffected cause (both) in conjunction and disjunction.

The characteristics of motion are - (i) being dependent or pertinent to one single material entity (or substance) (ii) not having any quality and (iii) being an unaffected cause in conjunction and disjunction (as cause precedes effects).

Motion has to be associated with a single substance. Motion has no qualities. Motion can be the Cause in a conjunctive or disjunctive interaction (or transaction) between several material entities (or substances).

All the above three descriptions are discussed in depth in modern systems theory.

द्रव्यगुणकर्मणां द्रव्यं कारणं सामान्यम्॥ १८॥

द्रव्यं कारणम् = material entity (or substance) is the (common) cause of, **द्रव्यगुणकर्मणाम्** = (all the three) material entity (or substance), quality and motion, **सामान्यम्** = in general.

In general a material entity (or substance) is the cause of (all the three) material entity (or substance), quality and motion.

As a generalization, it is being stated that a material entity (or substance) is the general (common) cause of any material entity (or substance), its qualities and its motions.

तथा गुणः ॥ १९ ॥

तथा = similarly, **गुणः** = quality (also).

Similarly quality (also).

Similarly quality also is the Cause (to the three).

संयोगविभागवेगानां कर्म समानम् ॥ २० ॥

कर्म = motion, **समानम्** = is common (cause of), **संयोगविभाग-**
वेगानाम् = conjunction, disjunction and speed.

Motion is common (cause of) conjunction, disjunction and speed.

Motion is the common cause for any conjunction (joining of substances together), disjunction (dividing any one substance into many) and speed (or impetus).

न द्रव्याणां कर्म ॥ २१ ॥

न कर्म = (but) not motion (is the cause), **द्रव्याणाम्** = of material entities (or substances).

But not motion (is the cause) of material entities (or substances).

Evidently, motion cannot be the cause of substances or their qualities (simply motion cannot produce a new material entity (or substance) or its qualities)

व्यतिरेकात् ॥ २२ ॥

व्यतिरेकात् = Due to being opposed.

Due to being opposed.

By virtue of motion being the very opposite of substance, motion cannot be the cause of substance. Also all motions will come to an end and therefore cannot be the causes for substances or their qualities.

द्रव्याणां द्रव्यं कार्यं सामान्यम् ॥ २३ ॥

द्रव्याणाम् = of material entities (or substances), **सामान्यम्** = the general characteristic, **द्रव्यम्** = (another) material entity (or substance), **कार्यम्** = as effect.

Of material entities (or substances) the general characteristic is to have (another) material entity (or substance) as effect.

The common or generalized characteristic of (component) material entities (or substances) is to produce another material entity (or substance) or an effect (a compounded substance which could be the result of their conjunction).

गुणवैधर्यात्र कर्मणां कर्म ॥ २४ ॥

गुणवैधर्यात् = due to being of opposite characteristic, **कर्म** = motion, **न** = cannot be produced, **कर्मणाम्** = of motions.

Due to being of opposite nature, motion cannot be produced of (other) motions.

If different motions of opposite nature are joined, they cannot produce another motion (as they neutralize each other).

Note: Till now the characteristics of (द्रव्यगुणकर्म) material entities (or substances), qualities and motions have been exhaustively dealt. In the next sūtra numbers and other fundamental entities are being described.

द्वित्वप्रभृतयः सङ्ख्याः पृथक्त्वसंयोगविभागश्च ॥ २५ ॥

द्वित्वप्रभृतयः = number '2' onwards, others, **सङ्ख्याः** = (all the) numbers, **च** = and / also, **पृथक्त्व** = differentiability, **संयोग** = conjunction (or combination), **विभागः** = disjunction (or division).

Number '2' onwards others (all the) numbers, and / also differentiability, conjunction, disjunction.

All numbers starting with '2' and up to infinity, as also differentiability, conjunction, disjunction - all have originated due to more than one substance.

INERTIA : FIRST LAW OF MOTION

असमवायात् सामान्यकार्यं कर्म न विद्यते ॥ २६ ॥

असमवायात् = due to not being inherent, **कर्म** = motion, **न** = does not, **विद्यते** = exist, **सामान्यकार्यम्** = as generalized effect.

Due to not being inherent, motion does not exist as generalized effect (always).

Being not inherent in (multiple) material entities (or substances), motion cannot be a generalized effect. It means that motion which is result of multiple substances is not known, as it is not found in combination with them.

Motion is not necessarily inherent in a substance. It has to be caused. This can be considered to be the equivalent of the first law of motion which describes inertia.

संयोगानां द्रव्यम् ॥ २७ ॥

द्रव्यम् = material entity (or substance), **संयोगानाम्** = (is the joint Effect) of conjunction (or combinations).

Material entity (or substance) (is the joint Effect) of conjunction (or combinations).

Substance is the joint effect of many conjunctions of other substances i.e. combination are mixture.

रूपाणां रूपम् ॥ २८ ॥

रूपम् = form/shape/colour can be (the conjunction or combination of), **रूपाणाम्** = (the effect) of many forms / shapes / colours.

Form/shape/colour can be (the conjunction or combination) of many forms/shapes/colours.

Many forms/shapes/colours can be merged into one shape/form/colour as in the case of VIBGYOR as white light.

UPWARD MOTION

गुरुत्वप्रयत्नसंयोगानामुत्क्षेपणम् ॥ २९ ॥

उत्क्षेपणम् = throwing up/upward motion is the effect, **गुरुत्वप्रयत्नसंयोगानाम्** = of conjunction of gravity and effort.

Throwing up/upward motion is the effect of conjunction of gravity and effort.

Upward motion is caused by the conjunction of effort and gravity (opposing it).

संयोगविभागाश्च कर्मणाम् ॥ ३० ॥

कर्मणाम् = of motions, **संयोगविभागाश्च** = also (caused by) conjunction and disjunction.

Of motions also (caused by) conjunction and disjunction.

Conjunction and disjunctions can cause motion (such as the above mentioned upward motion).

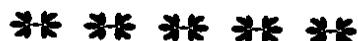
कारणसामान्ये द्रव्यकर्मणां कर्माकारणमुक्तम् ॥ ३१ ॥

कारणसामान्ये = in being generalized cause, **कर्म** = motion,

उक्तम् = is stated to be, **अकारणम्** = non cause, **द्रव्यकर्मणाम्** = of material entities (or substances) and motions.

In being generalized cause, motion is to be the non cause of material entities (or substances) and motions.

Motion cannot be the general cause of material entities (or substances) and their motions. Among the causes in general, motion has been stated to be not a cause of material entities (or substances) and motions. Motion cannot create material entity or its motion.



Chapter 1: Part-II

CAUSALITY PRINCIPLE

कारणाभावात्कार्याभावः ॥ ११

कार्याभावः = the absence of the Effect is, **कारणाभावत्** = due to the absence of the Cause.

The absence of the effect is due to the absence of the cause.

There can be no effect, if there is no cause. This is the fundamental principle of Causality. This sūtra is enunciating the causality principle, which states that for every effect there has to be a cause, existent, without fail. There cannot be any effect without a cause for it. This causality principle is the bed rock of rationality. The whole of Science is based on the causality principle. Therefore Vaiśeṣika can be declared as a Science, with the foundations on causality principle. Also, Vaiśeṣika can be stated to be a rationalist school of thought.

न तु कार्याभावत् कारणाभावः ॥ २१

तु = but, **न** = not that, **कारणाभावः** = the Cause is absent, **कार्याभावत्** = due to the absence of the effect.

But not that the Cause is absent due to the absence of the effect.

The absence of the effect does not mean the absence of the Cause. The cause can exist without any effects. While there cannot be any effect without a cause for it, there can be

a cause which has no effects. In Artificial Intelligence (AI) this is very important.

GENERALISATION AND SPECIALISATION

सामन्यं विशेष इति बुद्ध्यपेक्षम् ॥ ३ ॥

सामान्यम् = this is ‘general’, **विशेषः** = this is ‘special’, **इति** = these above are, **बुद्ध्यपेक्षम्** = perceived by the intellect.

This is ‘general’; this is ‘special’ - these are perceived by the intellect.

Generalization and Specialization are perceived by the intellect. Class hierarchy defines generalization and specialization. Evidently the class definition (**जाति**) is possible through the intellectual grasp or inference of the intellect. Therefore, generalization and specialization are the inferences of the intellect (**बुद्धि**).

EXISTENCE AS GENERALISATION

भावोऽनुवृत्तेरेव हेतुत्वात् सामान्यमेव ॥ ४ ॥

भावः = (the notion of) existence is, **एव** = only, **सामान्यम्** = a generalization, **अनुवृत्ते** = the grasp of intellect, **एव** = only, **हेतुत्वात्** = being the cause.

The notion of existence is only a generalization - the grasp of intellect being the cause.

Grasp by the intellect being the cause, the notion of existence is only a perception of generalization. The notion of existence is for all the three (द्रव्यगुणकर्म) material entities

(or substances), their qualities and their motions. The generalization abstraction is possible for all these three due to the intellect being able to grasp their existence. In other words, by the grasp of intellect a generalized perception or view of 'existence' is possible for all the three: material entities (or substances), their qualities, and their motions.

'Existence' is the super class or Universal class of all classes (of material entities (or substances) qualities and motion).

द्रव्यत्वं गुणत्वं कर्मत्वञ्च सामान्यानि विशेषाश्च ॥ ५ ॥

द्रव्यत्वम् = the characteristics or nature of (or substances), or material entities, **गुणत्वम्** = the characteristics or nature of qualities, **कर्मत्वम्** = the characteristics or nature of motions, **च** = and also, **सामान्यानि** = are generalized, **विशेषाश्च** = and also are specialized, **इति** = these above.

The characteristics or nature of material entities (or substances) the characteristics or nature of qualities, the characteristics or nature of motions are all generalized and are also all specialized.

Both generalization and specialization are applicable to all these three viz, substances or material entities, qualities and motions. All the three can be perceived to be satisfying generalization and also specialization. Evidently, for each of these three there exists a class - subclass hierarchical structure, thereby enabling their perception (in terms of generalization and specialization).

**CLASS HIERARCHY OF GENERALIZATION
AND SPECIALIZATION**

अन्यत्रान्त्येभ्यो विशेषेभ्यः ॥ ६ ॥

अन्त्येभ्यो विशेषेभ्यः = (excepting) the specialization instances at the end (of the class hierarchy), **अन्यत्र** = among all others (are part of the generalization and specialization).

Excepting the specialization instances at the end (of the class hierarchy) all others (are part of the generalization and specialization).

In the class hierarchy tree (therefore) the leaf nodes i.e. ending instances are to be exempted for considering the hierarchy. The last entries in the tree of hierarchy (comprising of generalization and specialization) i.e. the object instances have to be left out and at all other levels of the tree the perception of generalization and specialization is applicable. Evidently, the last level of the tree or hierarchy will be the instantiation where no class - subclass hierarchy can exist. At all other levels above the bottom most level, the hierarchy of the generalization and specialization exists for all the three (द्रव्य-गुण-कर्म).

The root node and the last ending nodes (instances or leaf nodes) will not have any hierarchy in a tree. This sūtra demonstrates the full knowledge of generalization and specialization hierarchy tree structure as applied to all material entities (or substances), qualities, and motions.

EXISTENCE – DEFINITION

सदिति यतो द्रव्यगुणकर्मसु सा सत्ता॥ ७॥

सा = it is, सत्ता = existence, यतः = from which, सदिति = the notion or perception 'this is existence' (is generated from), द्रव्यगुणकर्मसु = among the material entities (or substances), qualities, and motions.

It is 'Existence' from which the notion or perception that 'this is existence' (is generated from) among the material entities (or substances), qualities, and motions.

'Existence' is that due to which the notion or perception of existence for material entities (or substances), qualities, and motions is derived. 'Existence' is that due to which the existence of material entities (or substances), qualities, and motions is perceptible. In other words 'Existence' exists, because of which the material entities (or substances), qualities, and motions are perceived. In this sūtra the generalization of existence is being defined, as that notion or perception, due to which all existence of material (or substances), qualities, and motions can be perceived.

THE NOTION ON 'EXISTENCE'

द्रव्यगुणकर्मभ्योऽर्थान्तरं सत्ता॥ ८॥

सत्ता = (this notion of) 'Existence' (exists), अर्थान्तरम् = independently or separately, द्रव्यगुणकर्मभ्यः = from material entities (or substances), qualities, and motions.

This notion of 'Existence' exists independently or separately from all the three (material entities (or substances), qualities and motions).

The notion of Existence can be perceived to exist independent of all the three (द्रव्य-गुण-कर्म) In fact, it can be stated that the notion of Existence can be perceived independently in Vedanta, Brahman which is same as 'Existence' (सत्ता) is perceived to exist independent of all the three (द्रव्यगुणकर्म) (Brahman being their essence).

गुणकर्मसु च भावात् कर्म न गुणः ॥ ११

न कर्म = not motions (alone), न गुणः = not qualities (alone),
 भावात् = due to existence, गुणकर्मसु = in both qualities and motions.
 (च इति अत्रयोजनीयम्)

The notion of 'Existence' not motions (alone), not qualities (alone) due to existence in both qualities and motions.

The notion of 'existence' cannot be perceived only in qualities or motions individually, but only in the collective perception i.e. the notion of existence can be perceived only in the agglomerations or collections of all the qualities and motions.

सामान्यविशेषाभावेन च ॥ १० ॥

च = also (due to), सामान्यविशेषाभावेन = lack of generalization and specialization.

Also (due to) lack of generalization and specialization.

The notion of existence is different from all the three (Dravya, Guna and Karma) also by the reason of absence of generalization and specialization.

अनेकद्रव्यवत्त्वेन द्रव्यत्वमुक्तम् ॥ ११ ॥

द्रव्यत्वम् = the characteristics of material entities (or substances) i.e. 'substanceness', उक्तम् = is stated to exist, अनेकद्रव्यत्वेन = by being or by the existence of multiple substances (or material entities).

The characteristics of material entities (or substances) i.e. 'substanceness' is stated to exist by being or by the existence of multiple substances (or material entities).

'Substanceness' has been explained by means of it containing more than one substance i.e. 'being substance' is perceived from the agglomerations of multiple substances.

सामान्यविशेषाभावेन च ॥ १२ ॥

च = also (due to), सामान्यविशेषाभावेन = the absence of the generalization and specialization.

Also (due to) the absence of the generalization and specialization.

Existence (of substances) is different from all the three, also by the reason of the absence of generalization and specialization. (Generalization can be taken as Universality and Specialization can be taken as particularity).

तथा गुणेषु भावाद् गुणत्वमुक्तम् ॥ १३ ॥

तथा = similarly, गुणत्वमुक्तम् = 'qualityness' is stated to exist, गुणेषु = among qualities, भावात् = due to existence.

Similarly 'qualityness' is to exist among (many) qualities.

Similarly (as above) the 'qualityness' also is perceived

due to its existence among (many) qualities. Similar to 'substanceness', 'qualityness' also exists.

This will apply now for qualities.

सामान्यविशेषाभावेन च ॥ १४ ॥

च = also (due to), सामान्यविशेषाभावेन च = the absence of the generalization and specialization.

Also (due to) the absence of the generalization and specialization.

Existence (of motion) is different from all the three, also by the reason of the absence of generalization and specialization. (Generalization can be taken as Universality and Specialization can be taken as particularity).

This will apply now for qualities.

कर्मसु भावात् कर्मत्वमुक्तम् ॥ १५ ॥

कर्मत्वम् = "motionness", उक्तम् = is stated to exist, भावात् = due to its existence, कर्मसु = among motions.

'Motionness' is stated to exist due to its existence among motions.

The notion of 'motion' is stated to exist due to perception of its existence among various types of motion i.e. due to observation of various types of motion we can deduce 'motion exists'.

सामान्यविशेषाभावेन च ॥ १६ ॥

च = also (due to), सामान्यविशेषाभावेन च = the absence of the generalization and specialization.

Also (due to) the absence of the generalization and specialization.

Existence (of motion) is different from all the three, also by the reason of the absence of generalization and specialization. (Generalization can be taken as universality and specialization can be taken as particularity).

This is applicable to motions.

ONE EXISTENCE

सदिति लिङ्गाविशेषाद् विशेषलिङ्गाभावाच्चैको भावः ॥ १७ ॥

सत् = the notion or perception of 'Existence' exists, **इति** = also, **एको भावः** = as one existence, **लिङ्गाविशेषात्** = due to itself being a special indicator, **विशेषलिङ्गाभावाच्च** = due to the absence of any special indicator.

The notion or perception of 'existence' exists, also as one existence, due to itself being a special indicator, due to the absence of any special indicator.

'Existence' exists independently as 'One' due to it not being varying and also not being differentiable. Existence (**सत्**) or exists on its own, independent of everything.

The notion of Existence (**सत्**) in Vaiśeṣika is equivalent to notion of Brahman in Vedanta.

Application of all the above sūtras has been found to be relevant in Systems Theory, Perception Theory, Artificial Intelligence and Robotics.

Chapter 2 - Part I

रूपरसगन्धस्पर्शवती पृथिवी ॥ ११

पृथिवी = The element (or substance) Prithivi (has the qualities of), रूप = form/shape/colour, रस = taste, गन्ध = smell, स्पर्शवती = (having) touch.

The element (or substance) Prithivi has the qualities of form/shape/ colour, taste, smell and touch.

Pr̥thivī, the first of the (द्रव्य) material entities (or substances) has the qualities of form/shape/colour, taste, smell and touch. We can see that all these qualities are nothing but the physical properties which exist for any material element (or substance).

While Pr̥thivī is interpreted as solid matter in general, as an ancient abstraction Pr̥thivī is beyond just solid matter of modern times. However, as an approximation, this may be adequate in many situations - we can say that it represents solid matter in general.

Praśastapāda deals with Pr̥thivī in an elaborate manner. It is defined as that which has (पृथिवीत्व) or the 'solidity' of matter, as a quality of being Pr̥thivī. In addition to basic physical properties namely form/shape/colour, taste, smell and touch, it also has additionally defined qualities : counting (संख्या) measure (परिमाण) (volume or weight), differentiation (पृथक्त्व) of one item of Pr̥thivī from the other, combination or conjunction (or synthesis) (संयोग) disjunction, division

or decomposition (विभाग) being next (परत्व) being previous (अपरत्व) being heavy/ weight or gravity (गुरुत्व) All the above are evident for solid matter. While being heavy or having weight or gravity (गुरुत्व) can be inferred, all the other qualities or properties are directly observable by the five senses. Praśastapāda also explains various types of colours, six types of tastes, various types of smell. Praśastapāda also clarifies that Pr̥thivī (पृथिवी) could be permanent (नित्या) or transient (अनित्य) The atomic form of Pr̥thivī is described to be permanent (नित्य) and all the superficial forms (such as multitude of material forms) as transient (अनित्य). Thus, all the observable solid material forms and entities are identified as transient (temporarily existent) forms of Pr̥thivī. The permanent (नित्य) form of Pr̥thivī is stated to be only in the form of atoms (since an atom is identified to be the ultimate individual entity of Pr̥thivī). The aggregations of atoms are the effects caused (by atoms) as various forms of solid matter (i.e. solid objects). These forms are the effects (कार्य) enjoyable or experienced by the body, senses and the mind. Clearly the law of conservation of matter in atomic form was understood.

To summarize, we may state that the material element (or substance) Pr̥thivī is largely identified with solid matter of Physics, with all its known properties. However, it may be noted that Pr̥thivī goes beyond the solid matter, in addition to being that, with properties which may go beyond the known properties of solid matter. Thus, Pr̥thivī goes

beyond Vaiśeṣika into Āyurveda (medicine), Śilpaśāstra (engineering), Mantraśāstra (the science of sounds and vibrations). The appropriate adaptation and additional characteristics required of Pr̥thivī are to be identified and utilized in each area of its application.

रूपरसस्पर्शवत्य आपो द्रवाः स्निग्धाः ॥ २१॥

आपः = Apa are, द्रवाः = liquids, रूपरसस्पर्शवत्यः = having the properties of forms/ shape/ colour, taste and touch (ability), स्निग्धाः = are viscid (oily/soft).

‘Apa’ are liquids having the properties of forms / shape/ colour, tatste and touch (ability) are viscid (oily/ soft).

We can state that Āpa refers to the abstract notion which is liquid and having the properties of forms/ shape/ colour, taste, and touch (ability). It is clear that the quality of smell (गन्ध) is dropped in Āpa when compared to the qualities of Pr̥thivī.

Praśastapāda elaborates that the Āpa have the liquidity (आपत्व) in addition to form/ shape/ colour, taste, and touch (ability) Āpa also have additional qualities such as counting (संख्या) measure (परिमाण) differentiability (पृथक्त्व) conjunction (संयोग) disjunction (विभाग) being next (परत्वं) being previous (अपरत्वं) being heavy or having weight or gravity (गुरुत्व) having trait or habit (संस्कार) - all the fourteen qualities. Viscidity or softness or oiliness (स्नेह) liquidity (द्रवत्व) are inbuilt in Āpa. Also, there are two aspects: permanent and being impermanent or transient. Āpa is permanent only in the atomic state and all other states which are effects of

the atomic state or impermanent or transient. The tongue (रसन) is identified to be the sense organ associated with Āpa. Forms of Āpa are identified by Praśastapāda as water (or liquids) in various forms. Clearly again the law of conservation of matter is understood for the liquid state also.

As earlier, we can state that Āpa is a tattva (तत्त्व) which is an abstract notion of a material entity (or substance) (द्रव्य) whose special cases of occurrence or instances are all liquids (such as water). All properties of liquids are identified as the properties of Āpa.

तेजो रूपस्पर्शवत् ॥ ३ ॥

तेजः = Teja, रूपस्पर्शवत् = has forms/shapes/colour and touch (ability).

Teja has forms / shapes / colour and touch (ability).

The material entity (or substance) Teja has colour and touch (ability). Teja is an abstract substance (or material entity) (द्रव्य) which may be equated with the Energy Principle in Modern Science. Traditionally Teja was equated with Light, Agni or Fire etc. Agni was identified in the Vedas as the Universal Energy Principle which has multifarious forms such as Light, Fire (heat/ flame) (which could be 'digestive fire' etc.) - all referring to the generalized principle of Energy.

Praśastapāda elaborated the qualities of Teja as being colour, touch (ability), counting, measure, differentiability, conjunction, disjunction, being previous, being next etc. The sensory organ 'eye' is associated with Teja, in the context

of Teja being Light. Teja has been identified to have physical forms such as normal fire, light, electricity, digestive or physiological fire (hunger) and also all types of heat (as in heating gold and other metals).

Teja or Agni has been identified in the Vedas as the general energy principle, which is prevalent and pervading everywhere in the Universe: in the plants, in the trees (as one) in the elements, in the Universe and also in the liquids (गर्भोऽस्योषधीनां गर्भो वनस्पतीनां गर्भो विश्वस्य भूतस्याग्ने गर्भोऽपामसि ।) Thus, the Energy principle in its varied universal forms as Light, Heat, Electricity, and Metabolic Energy is identified in the Veda. In the Vaiśeṣika also the same Universal Energy principle has been identified as Teja, in consistence with the Vedas, as Agni. Similarly, in all the other subjects such as Āyurveda, Yoga, Śilpaśāstra, Vāstuśāstra Agni or Teja is identified, clearly discussed and understood in various contexts in the entire literature, all in consistence with Vaiśeṣika on one hand and Vedas on the other.

स्पर्शवान् वायुः ॥ ४ ॥

वायुः = Vayu, स्पर्शवान् = has, the quality of touch (ability).

Vayu has the quality of touch (ability).

The material element (or substance) Vāyu has the quality of touch (only). All other qualities such as form/ shape/ colour, sound, taste, smell are not present in Vāyu. Vāyu can be taken as the gaseous state of matter, in practical physical terms, even though Vāyu is much beyond that. Vāyu is not just gaseous state alone - the scope of its definition goes

much beyond. Praśastapāda elaborates the qualities of Vāyu to be touch (ability), counting (संख्या) measure (volume or weight) (परिमाण) differentiability (पृथक्त्व) conjunction (संयोग) disjunction or division (विभाग) being next (परत्व) being previous (अपरत्व) and trait or habit (संस्कार).

The sensory organ skin (for touch) is identified to be associated with Vāyu.

The effects of Vāyu have been identified by Praśastapāda as all types of touch (ability), vibrations, sounds (all of which are produced by contact or touch), gaseous motion and interaction of two gases moving in opposite direction. The role and effects of Prāṇavāyu in physiology is also discussed by Praśastapāda as being the main agent or cause of physiological activities related to (digestion of) food (रस) excretion (मल) tissues (धातु) in Āyurveda. While playing all these roles, the Prāṇavāyu takes different forms as Apānavāyu, Vyānavāyu, Udānavāyu, Samānavāyu. In Āyurveda and Yoga the role of Prāṇa is described in detail. In some parts of Yoga, Prāṇa is defined as the effect produced due to the conjunction (संयोग) of the digestive fire Agni (जठराग्नि) with Vāyu. Various disorders and diseases in the body are interpreted as distortions (विकार) of Prāṇa in the body. Therefore, by Yogic techniques such as Prāṇāyāma it is possible to rectify the disturbances or distortions of the Prāṇa in the body, resulting in the cure of various maladies in the body. This is the main principle behind Yogic therapy. In some contexts Prāṇa and Vāyu are identified to be the

same entity. The entire Hathayoga is based upon the Prāṇa and its regulation, resulting in cure and therapy of all the disorders of the body and mind. Prāṇa, if normal, results in perfect health of the body and mind, while its deformations or deviations from normalcy are stated to lead to pathological conditions of disease, malady, infection and other health disorders. Prāṇāyāma can therefore cure and also prevent all health disorders.

त आकाशे न विद्यन्ते ॥ ५ ॥

ते = they (all the qualities), न विद्यन्ते = do not exist, आकाशे= in Akasa.

They (all the qualities) do not exist in Akasa.

In the material entity (or substance) Akāśa all the qualities (such as forms/shape/colour, smell, taste, touch etc.) do not exist. But other qualities such as sound (शब्द) counting (संख्या) measure (परिमाण) differentiability (पृथक्त्व) conjunction (संयोग) disjunction (विभाग) do exist in Akāśa.

Akāśa has to be identified as Ether in modern science i.e. Classical Physics. Though in Relativistic Physics Ether is not accepted, prior to the proposition of Theory of Relativity by Einstein, Ether was accepted in Classical Physics. Einstein explained the results of Michelson - Morley experiment by dropping Ether from his consideration. However, the laws of Electromagnetism given by Maxwell were originally derived by Maxwell, using Ether, Maxwell's laws where hydro dynamic laws for wave motion in Ether as the medium.

In Vaiśeṣika we have to accept ether as Ākāśa. Cartesian space or referential space is separately defined as Dik (दिक्) in Vaiśeṣika.

Ākāśa has sound or vibration in it, while Dik or referential space has nothing in it. It is only meant for cartesian reference for location. The definition of Dik is given in the next chapter as that which gives rise to the cognition and statements as 'This is far from that' etc. i.e. the perception of distance and locational references.

सर्पिंजतुमधूच्छिष्टानामग्निसंयोगात्
द्रवत्वमदिभः सामान्यम् ॥ ६ ॥

द्रवत्वम् = liquidity is, सामान्यम् = is a common quality, अदिभः = for liquids (Apa) and also for, सर्पिः = ghee or clarified butter, जतु = lac, मधूच्छिष्टानां = bee wax or honey comb wax, अग्निसंयोगात् = due to contact or conjunction with Agni.

Liquidity is a common quality for liquids (Apa) and also for ghee (or clarified butter), lac, bee wax (or honey-comb wax) due to the contact or conjunction with Agni.

Upon the contact or conjunction with Agni or heat i.e. due to melting of solids as ghee, lac and bee wax acquire liquidity as a common property of Āpa. When some solids such as ghee, lac, bee wax are exposed to heat they melt to become liquids - thus liquidity is shown to be a common property for such solids and normal liquids (such as water, oil etc.). Hence, we can see here some understanding of change of state of matter from solid to liquid due to the application of heat (change of state from liquid to gaseous state is not mentioned here).

त्रपुसीसलोहरजतसुवर्णानामग्रिसंयोगात्
द्रवत्वमद्धिः सामान्यम् ॥ ७ ॥

द्रवत्वम् = liquidity is, **सामान्यम्** = common property, अद्धिः = for liquids and also for, त्रपु = tin, सीस = lead, लोह = iron, रजत = silver, सुवर्णानाम् = gold, अग्निसंयोगात् = due to contact with Agni.

Liquidity is common property for liquids and also for tin, lead, iron, silver and gold due to their contact with Agni.

Due to the contact with Agni or heat, metals such as tin, lead, iron, silver and gold also acquire liquidity (quality) i.e. liquid state, similar to all other liquids ($\bar{A}pa$). In this sūtra the change of state from solid to liquid is further elaborated for metallic objects (while in the previous sūtra non-metallic objects are described as to be melting upon application of heat).

Therefore, the author was quite familiar with the change of state from solid to liquid state. He also brought out his knowledge with various materials which melt in to liquid state upon application of heat. His familiarity with change of state from liquid to gaseous state is not clear in this sūtra. However, in later chapters the author explains evaporation i.e. change of state from liquid to gaseous state or vapour. Therefore, on the whole, the author of Vaiśeṣika was familiar with complete change of state from solid to liquid; and liquid to gaseous state.

विषाणी ककुद्यान् प्रान्तेवालधिः सास्त्रावान् इति
गोत्वे दृष्टं लिङ्गम् ॥ ८ ॥

गोत्वे = in being a cow (or in 'cowness'), **लिङ्गम्** = the indication / sign/or admitted mark, **वृष्टम्** = is seen (that the cow is), **विषाणी** = as having horns, **कुद्यान्** = having a hump, **प्रान्तेवालधिः** = and having a tail with long hairs at the end, **सास्नावन्** = having a hanging front neck extension or 'dewlap'.

In being a cow (or in 'cowness') are the indication/ sign or admitted mark is seen (that the cow is) having horns, having hump, having a tail with long hairs at the end and having a hanging front neck extension.

A cow can be identified only with the marked indications as having horns, having hump, having a tail with long hairs at the end and having a hanging front neck extension. Without such explicit and unique characteristics, an animal cannot be identified as a cow. In this sūtra the author is defining a class of objects or Jāti (जाति) by identifying the unique characteristics of the objects of the class. In this case the description is for the object 'cow' which will be adequate for the description for the class of objects 'cows'.

This sutra indicates the knowledge of the author with regard to object identification and class identification with the description of unique characteristics of the class of objects. This concept is known as generalization/ specialization hierarchy of a class in object oriented modelling, which is used extensively in Computer Science.

स्पर्शश्च वायोः ॥ १ ॥

च = and (similarly), **वायोः** = of Vayu, **स्पर्शः** = touch (is the indication or admitted mark).

And (similarly) touch is the indication or admitted mark (लिङ्गं) of Vāyu

Similarly (as in the case of a cow) the characteristic or marked indicator admitted mark (लिङ्गं) for Vāyu is touch. In other words, touch is the only characteristic or admitted mark for Vāyu. No other quality is admitted mark (लिङ्गं) for Vāyu. The sense of touch is spread all over the body and Vāyu is the presiding deity for touch. The other extensions of the sense of touch or contact can be elaborated as: sound (शब्द) retention (धारण) vibration (कम्प) reverse motion, capability of causing motion in clouds etc. These descriptions are related to 'work' associated with Vāyu. Even though Vāyu is invisible and also cannot be directly observed, the varied and multiple functions of Vāyu can be inferred. Praśastapāda also discusses some of the interactions of gases or streams of air in the context of vibratory motion of blades of grass and other objects, all involving motions of various kinds. These discussions are centered on streams of Vāyu combining together and moving upward, causing vibratory motion. Thus, the role of the atmospheric gasses in causing various types of motions is also discussed. Finally the role of Prāṇa and its five components in the bodies of living beings, in terms of their role in tissues (धातु) nutrition (रस) excretion (मल) etc. in Āyurveda and Yoga are discussed. Thus we see that even though Vāyu can be taken as gaseous state of matter at the level of Physics, in the domains of physiology and therapy Vāyu assumes many additional

roles in the bodies of living beings as discussed earlier. In Mantraśāstra Vāyu is associated with the sound 'ya' (य) To conclude, Vāyu is a Tattva or an abstract notion or a frame work, while gas or gaseous state of matter is only a specific material instance of Vāyu.

न च दृष्टानां स्पर्शं इत्यदृष्टलिङ्गं वायुः ॥ १० ॥

वायुः = Vayu, **अदृष्टलिङ्गः** = has an admitted mark of being invisible (with), **स्पर्शः** = touch, **न च दृष्टानाम्** = and not (so as of) visible entities.

Vayu has an admitted mark of being invisible (with) touch and not (so as of) visible entities.

Vāyu has the invisible touch as the quality associated with it.

अद्रव्यवत्त्वेन द्रव्यम् ॥ ११ ॥

द्रव्यम् = Vayu is a material entity (or substance), **अद्रव्यवत्त्वेन**= by not being dependent or combining with other material entities (or substances).

Vayu is a material entity (or substance) by not being dependent or combining with other material entities (or substances).

The identity of Vāyu is also evident from its not combining with other material elements (or substances) It has independent existence.

क्रियावत्त्वात् गुणवत्त्वाच्च ॥ १२ ॥

च = and (also), **क्रियावत्त्वात्** = by possessing actions and, **गुणवत्त्वात्** = by possessing qualities.

And (also) by possessing actions and by possessing qualities.

Vāyu is a material entity (or substance) also because of possessing actions and qualities.

अद्रव्यत्वेन नित्यत्वमुक्तम् ॥ १३ ॥

अद्रव्यत्वेन = by not being dependent on any other material entity (or substance), **उक्तम्** = (Vayu) is said to be, **नित्यत्वम्** = permanent.

By not being dependent on any other material entity (or substance) Vayu is said to be permanent.

The eternity or permanence of Vāyu is evident from its not combining with or not being dependent on other material entities (or substances).

वायोर्वायुसमूच्छनं नानात्वलिङ्गम् ॥ १४ ॥

नानात्व = being in multiple forms (or plurality is), **लिङ्गम्** = marked indication or admitted mark, **वायोः** = of Vayu (is in), **वायु-समूच्छनम्** = interaction or conjunction of multiple forms of Vayu.

Being in multiple forms or plurality is that marked indication or admitted mark of Vayu (duties) interaction or conjunction of multiple forms of Vayu.

Multiple forms of Vāyu combine together i.e. multiple gasses combine together or collide together - this is a mark of plurality of Vāyu.

वायुसन्निकर्षे प्रत्यक्षाभावात् दृष्टं लिङ्गं न विद्यते ॥ १५ ॥

वायुसन्निकर्षे = upon contact (or conjunction) with Vayu, **प्रत्यक्षा-भावात्** = there being no direct or visible perception or observation,

दृष्टं लिङ्गम् = visible proof or indicative characteristic, न विद्यते = does not exist.

Upon contact (or conjunction) with Vayu, there being no direct or visible perception or observation, visible proof or indicative characteristic does not exist.

Since Vāyu is not directly perceptible or observable due its contact (with any object), a visible proof or indicative characteristic does not exist for the existence of Vāyu.

सामान्यतो दृष्टाच्चाविशेषः ॥ १६ ॥

अविशेषः = not special (but), **सामान्यतः** = in general, **च** = and (also), **दृष्टात्** = due to being seen.

The invisibility of Vayu is in general and nothing special, as can be seen from observation also.

Vāyu is invisible. This fact is well-known in general, due its observability.

तस्मादागमिकम् ॥ १७ ॥

तस्मात् = therefore, **आगमिकम्** = based on Agama or Veda.

Therefore based on Agama or Veda.

The name of Vāyu and its identity is based on the Veda. Here is a reference to Veda being made, as the basis for identifying Vāyu as a Dravya. In Veda, Vāyu is referred and described as a Devatā (वायुर्वै क्षेपिष्ठा देवता).

This sūtra indicates the link with the Veda for Vāyu in Vaiśeṣika. We may generalize that the Dravyas of Vaiśeṣika were depicted as Devatās in the Veda.

संज्ञाकर्म त्वस्मद्विशिष्टानां लिङ्गम् ॥ १८ ॥

संज्ञा कर्म = the naming, function (or action), **लिङ्गम्** = is the indicative characteristic of, **त्वस्मद्विशिष्टानाम्** = special people (or agencies) such as Yogis or Saints.

The naming function (or action) is the indicative characteristic of special people (or agencies) such as Yogis or Saints.

Naming function is the characteristic indication of special people such as Yogis and Saints who have special observation powers or occult powers for observing invisible entities or objects which cannot be observed by the ordinary people with the naked eye.

प्रत्यक्षप्रवृत्तत्वात् संज्ञाकर्मणः ॥ १९ ॥

संज्ञाकर्मणः = the naming function (or action) will be performed (normally), **प्रत्यक्षप्रवृत्तत्वात्** = due to being directly observable.

Normally the naming function (or action) will be performed (by all) due to being directly observable.

As normally names are given only to objects which are visible or observable, the naming of Vāyu is done by special people such as Yogis or Saints or by special agencies such Veda, who have the knowledge of unobservable entities also as (such as Vāyu). Here the convergence of Veda with the occult powers (of Yogis) is being shown. In fact as Yogis can 'see' or 'feel' extra sensory perception (ESP). The Veda also describes things which cannot be seen by the naked eye of normal human beings.

निष्कमणं प्रवेशनमित्याकाशस्य लिङ्गम् ॥ २० ॥

निष्कमणम् = exiting and, प्रवेशनम् = entering, इति = these (two) are, लिङ्गम् = indicative characteristics or proof, आकाशस्य = of Akasa.

Exiting and entering - these (two) are the indicative characteristics or proof of Akasa.

Now the definition of indicative characteristics of $\bar{A}kāśa$ or being described. There should be something into which the entry of any objects or entities takes place, as also their exit that is $\bar{A}kāśa$. Aristotle stated $\bar{A}kāśa$ with a different connotation. Edington also stated $\bar{A}kāśa$. Originally in Classical Physics, Ether was identified with the same characteristics. Therefore, we also identify $\bar{A}kāśa$ as Ether in Classical Physics. Though Ether was not accepted in Modern Physics (especially in Theory of Relativity), there have been controversial approaches and arguments on the existence or otherwise of Ether. However, Ether was accepted throughout the history of Science, until the Special Theory of Relativity was proposed by Einstein. *Historically, $\bar{A}kāśa$ of Vaiśeṣika is the earliest reference to Ether, which continued unchallenged till recently and holds good even now.* The Maxwell's laws of electromagnetic wave propagation were originally derived from wavemotion in Ether as the medium. In the General Theory of Relativity, Ether was admitted by Einstein. Finally, we have to admit ether or $\bar{A}kāśa$ even now also.

तदलिङ्गमेकद्रव्यत्वात् कर्मणः ॥ २१ ॥

तत् = that (is), अलिङ्गम् = not the proof or indicative charac-

teristic, कर्मणः = of motion, एकद्रव्यत्वात् = due to being only one Dravya (i.e. substance or material entity).

That is not the proof or indicative characteristic of motion due to being only one Dravya (i.e. substance or material entity).

This is an objection. It is being objected that the entry or exit of any object (i.e. motion) is within that object - not outside it. Therefore, it is being objected that Ākāśa cannot be uniquely defined as a Dravya.

The objection is being refuted in the next sūtra.

कारणान्तरानुकूप्तिवैधर्म्याच्च ॥ २२ ॥

च = also, कारणान्तरानुकूप्तिवैधर्म्यात् = due to being of the opposite or deferent nature.

Also due to the being of the opposite or deferent nature.

Also due to being caused by the different cause or due to being of opposite nature as the cause, and also because they defer in property from the characteristic of another non combinative cause.

संयोगादभावः कर्मणः ॥ २३ ॥

कर्मणः = of motion, संयोगात् = due to conjunction, अभावः = being absent.

Due to conjunction motion is absent.

Motion cannot be produced on account of conjunction.

कारणगुणपूर्वकः कार्यगुणो दृष्टः ॥ २४ ॥

दृष्टः = it is seen that, कार्यगुणः = the quality of effect is, कारणगुणपूर्वकः = preceded or caused by the quality of the cause.

It is seen that the quality of effect is preceded or caused by the quality of the cause.

The quality of effect is preceded or caused by the quality of the cause.

The quality of the cause is found in the quality of effect.

कार्यन्तराप्रादुर्भावाच्च शब्दः स्पर्शवतामगुणः ॥ २५ ॥

च = also, शब्दः = Sabda (vibration) is, स्पर्शवताम् = among those which have touch, कार्यन्तराप्रादुर्भावात् = due to having been born out of a different or alternate effect, अगुणः = without any quality.

Sabda (vibration) is also without any quality among those which have touch, due to having been born out of a different or alternative effect.

Śabda (vibration) can be created or born out of different or alternate effect other than those which have touch or contact. Among those entities which have touch or contact Śabda (vibration) is without quality, having born out of different or alternate effect. (Anāhataśabda or Śabda born without a contact)

परत्र समवायात् प्रत्यक्षत्वाच्च नात्मगुणो न मनोगुणः ॥ २६ ॥

परत्र समवायात् = due to the qualities being inherent in other (object)s, प्रत्यक्षत्वाच्च = also as can be observed directly, नात्मगुणः= the qualities of the self (atman) do not exist, न मनोगुणः = also the qualities of the mind (manas) do not exist.

The qualities of the self (atman) do not exist and also the qualities of the mind (manas) do not exist, as can be observed

directly and also due to the qualities being inherent in other (object)s (other than themselves).

It is meant that by direct observation we can see that no qualities exist in self (atman) by itself, except that the qualities are inherent in other objects. Similarly for the mind also the qualities exist inherently in other objects.

परिशेषालिङ्गमाकाशस्य ॥ २७ ॥

परिशेषात् = being reminder, **लिङ्गम्** = (Sabda or vibration is) the proof or indicative characteristic, **आकाशस्य** = of Akasa.

Sabda or vibration is indicative characteristic of Akasa or Ether, being the (last) remainder.

Of all the other qualities such as form/shape/colour, smell, touch and taste, Śabda being the last remaining quality, it is the indicative characteristic of Ākāśa.

द्रव्यत्वनित्यत्वे वायुना व्याख्याते ॥ २८ ॥

द्रव्यत्वनित्यत्वे = in being a Dravya (substance or material entity) and in being permanent, **व्याख्याते** = commented upon, **वायुना** = along with Vayu (i.e. similar to Vayu) in being invisible.

In being a Dravya (Substance or material entity) and in being permanent (नित्य) (it is) commented upon along with Vayu (i.e. similar to Vayu) in being invisible.

Ākāśa is commented upon or described as being similar to vāyu, as dravya and permanent. (नित्य).

तत्त्वम्भावेन ॥ २९ ॥

भावेन = by existence, **तत्त्वम्** = being one (unity).

Being one (unity) by existence.

Ākāśa is one tattva by being in existence. Therefore, Ākāśa exists.

शब्दलिङ्गाविशेषाद्विशेषलिङ्गाभावाच्च ॥ ३० ॥

च = also, शब्दलिङ्गाविशेषात् = due to being common (not special) with the indicative characteristic of sabda, विशेषलिङ्गाभावात् = due to the absence of any other special indicative characteristics.

Also due to being common (not special) with the indicative characteristic of sabda and due to the absence of any other special indicative characteristics.

Ākāśa is known to exist due to having only Śabda (or vibration) as indicative characteristic and also due to the absence of any other indicative characteristics.

तदनुविधानादेकपृथक्त्वञ्चेति ॥ ३१ ॥

तदनुविधानात् = due to being accordingly, च = and, एकपृथक्त्वम् = single, differentiable, इति = thus concluded.

Due to being accordingly and single, differentiable - thus concluded.

The conclusion is that Ākāśa exists as one single differentiable Dravya.

Chapter 2 : Part -II

पुष्पवस्त्रयोः सति सन्निकर्षे गुणान्तराप्रादुर्भावो
वस्त्रे गन्धाभावलिङ्गम् ॥ ११ ॥

सति = in the event of, **पुष्पवस्त्रयोः** = in the (close) contact of a cloth and (some) flowers, **गुणान्तराप्रादुर्भावः** = the lack of production of any other alternate quality (other than the particular smell of the same flowers), **लिङ्गम्** = is an indicative characteristic, **वस्त्रे गन्धाभाव** = of the absence of any other smell in the cloth (which had the contact with flowers) except the same smell of the flowers in the cloth.

The non production of smell which is perceived in the cloth after or during its contact with flowers is the indicative characteristic of the non existence of the smell in the cloth.

Due the close contact of flowers and a cloth, any other alternate quality is not produced (except the smell of the flower). This is the indicative characteristic of the cloth being free from any smell or odour.

व्यवस्थितः पृथिव्यां गन्धः ॥ २१ ॥

पृथिव्याम् = in prithivi, **गन्धः** = smell or odour, **व्यवस्थितः** = is established (within it).

In prithivi smell or odour is established (within it).

Smell or odour is a quality inherently established within **पृथिवी** (and not acquired due to contact).

एतेनोष्णता व्याख्याता ॥ ३१ ॥

एतेन = by this (same argument), **उष्णता** = being warm or hot, **व्याख्याता** = is commented (described).

By the same argument being warm or hot i.e. heat is commented (described).

By the same argument inherent presence of heat is also described (for Teja).

तेजस उष्णता ॥ ४ ॥

उष्णता = heat, तेजसः = (is the quality) of Teja.

Heat is the quality of Teja.

By the above argument heat is the quality of Teja or Agni i.e. energy principle described earlier.

अप्सु शीतता ॥ ५ ॥

शीतता = coldness or being cold, अप्सु = (exists) among Apa (liquids).

Coldness or being cold exists among Apa (liquids)

Liquids have coldness existing in them. In the context of modern science heat is measured by temperature. Liquids have lower temperatures (when compared to fire).

TIME

अपरस्मिन्नपरं युगपत् चिरं क्षिप्रमिति काललिङ्गानि ॥ ६ ॥

काललिङ्गानि = the indicative characteristics of Time are:, अपरस्मिन् = “in later time” or “posterior”, अपरम् = “later”, “in posterior time”, युगपत् = “together” or “simultaneously”, चिरम् = “long time later”, क्षिप्रम् = “fast”, इति = all these above.

The indicative characteristics (लिङ्ग) of Time are: “in the later time” or “posterior” “later”, “in posterior time”, “together” or “simultaneously”, “long time later” “fast” etc.

Now the indicative characteristics of Time are being described. Perceptions such as 'later' or 'together' or 'simultaneously' 'fast' 'long time later' are indicative characteristics of Time. These indications provide the proof of existence of Time.

द्रव्यत्वनित्यत्वे वायुना व्याख्याते ॥ ७ ॥

द्रव्यत्वनित्यत्वे = in being a substance and in being eternal or permanent, **व्याख्याते** = (Time) is commented, **वायुना** = along with Vayu.

In being a substance and in being eternal or permanent, Time is commented along with Vayu (Similar to Vayu).

Being invisible, Time is being compared with Vāyu (which is also invisible). As Vāyu is a Dravya and also permanent or eternal नित्य so is Time (Dravya and permanent (नित्य)). As we all know, Time is eternal and is a fundamental entity in Physics. In Classical Physics Time is one of the four fundamental entities (other three being Space, Matter and Energy).

In the previous sūtras and later sūtras all the four fundamental entities of Classical Physics are defined and accepted as Dravya by Vaiśeṣika. (Matter is described in three different components of states of solid, liquid and gaseous states).

We can safely infer that the fundamental entities of Classical Physics were inherited from Vaiśeṣika of much greater antiquity through the history, including Greek Science, which was influenced by Indian thought.

तत्त्वं भावेन ॥ ८॥

तत्त्वम् = the nature of Time is (recognized), भावेन = by the nature of its existence.

The nature of Time is recognized by the nature of its existence.

The nature or unity (oneness) of Time is explained by the explanation of unity (oneness) of its existence.

नित्येष्वभावादनित्येषु भावात्कारणे कालाख्येति ॥ ९॥

कालाख्येति = the name ‘Time’ (is applicable), कारणे = to a cause, **नित्येष्वभावात्** = due to its lack of existence among the eternals, **अनित्येषु भावात्** = due to its presence or existence among the non eternals.

The name ‘Time’ is applicable to a cause due to its lack of existence among the eternals and due to its presence or existence among the non eternals.

The name Time is applicable to a cause as much as it does not exist among eternal substances and it exists among non eternal substances. Temporary bodies have Time as a causal factor and permanent bodies do not have any such thing as Time. There is no concept of Time for eternal bodies which are permanent. Time exists only for temporary bodies as a cause.

SPACE

इत इदमिति यतस्तद्विश्यं लिङ्गम् ॥ १०॥

यतः = due to which (we get the perception of), **इतः** = ‘from here’, **इदम्** = ‘this’, **इति** = the above, **तत्** = that (is), **लिङ्गम्** = indicative characteristic, **दिश्यम्** = of Dik or direction or space.

Direction or space is that from which we get the perceptions of 'from here', 'this' etc. (which are the indicative characteristics).

Here the Space is being defined as having the indicative characteristics of spatial reference such as 'from here', 'this' etc. These are the indicative characteristics of Cartesian Space, normally attributed to Descartes, who belonged to a period of several thousand years later to Vaiśeṣika. We can credit Vaiśeṣika and its predecessors such as the Vedas for the original and first definitions of Time, Space, Matter and Energy. (As Vaiśeṣika is only a Darśana of Vedas).

द्रव्यत्वनित्यत्वे वायुना व्याख्याते ॥ ११ ॥

द्रव्यत्वनित्यत्वे = in being a substance and in being eternal or permanent, **व्याख्याते** = (Time) is commented or described, **वायुना** = along with Vayu.

In being a substance and in being eternal or permanent Time is commented or described along with Vayu.

Being invisible, Space is being compared with Vāyu (which is also invisible). As Vāyu is a Dravya and also permanent or eternal (नित्य) so is Space (Dravya and permanent (नित्य)). As we all know, Space is eternal and is a fundamental entity in Physics. In Classical Physics, Space is one of the four fundamental entities (other three being Time, Matter and Energy).

In the previous sūtras and later Sutras all the four fundamental entities of Classical Physics are defined and accepted as Dravyas by Vaiśeṣika. (Matter is described

in three different components of solid, liquid and gaseous states).

We can safely infer that the fundamental entities of Classical Physics i.e. Matter, Energy, Space and Time were inherited from Vaiśeṣika of much greater antiquity.

तत्त्वभावेन ॥ १२ ॥

तत्त्वं = the nature of Space is (recognized by), भावेन = by nature of its existence.

The nature of Space is by nature of its existence.

The nature or unity (oneness) of Space is explained by the explanation of unity (oneness) of its existence.

कार्यविशेषेण नानात्वम् ॥ १३ ॥

नानात्वम् = diversity or different forms of Space, कार्यविशेषेण = due to different effects of Space.

Diversity or different forms of Space due to different effects of.

Diversity of Space is due to the diversity of spatial forms which are the effects of Space.

We see multitude of variety of forms or directions in Space - all of them are recognized as the effects of Space, which is single Dravya i.e. substance. Directions are explained next.

आदित्यसंयोगाद् भूतपूर्वाद्विष्यतो भूतात्र प्राची ॥ १४ ॥

प्राची = the direction is considered 'East', आदित्यसंयोगात् = due to its conjunction with Sun, भूतपूर्वात् = due to its being so in the past (as it was in past) and therefore in the present, भविष्यतः = due to its being so in the future (as it is going to be in the future), च = and, भूतात् = due to (being so in) past.

The direction is considered 'East' due to its conjunction with Sun, due to its being so in the past (as it was in past) and therefore in the present due to its being so in the future (as it is going to be in the future) and due (to being 20) in the past.

Due to the conjunction of the Sun that direction of Space is considered to be 'East', due to it being so in the past (in the present), and in the future also.

'East' is considered to be 'East' due to its conjunction or contact with Sun in the past (in present) and in the future also.

तथा दक्षिणा प्रतीची उदीची च ॥ १५ ॥

तथा = similarly, दक्षिणा = South, प्रतीची = West, उदीची = North, (च = also.)

Similarly South, West, North also.

Based on the definition of East in the previous sūtras, the definitions of other directions such as South, West and North are being derived. East being the primary reference of direction due to its conjunction with Sun, all other directions may be derived from it.

एतेन दिगन्तरालानि व्याख्यातानि ॥ १६ ॥

एतेन = by this (same logic), दिगन्तरालानि = intervals between directions, व्याख्यातानि = are commented or described.

By this same logic the intervals between directions are commented or described.

By extending the same logic as in the previous sūtras, we can derive the interval directions such as North-East,

North-West, North North-East, North North-West, South East, South West, South South East, South South West etc. All these directions are critical requirements for all aspects of human life, especially navigation, transportation and architecture (Vāstu).

With this sūtra the basic definitions of fundamental physical entities are completed. In the next sūtras other entities and their attributes will be described.

सामान्यप्रत्यक्षाद्विशेषाप्रत्यक्षाद्विशेषस्मृतेश्च संशयः ॥ १७ ॥

संशयः = doubt (arises), सामान्यप्रत्यक्षात् = due to observable perception of common properties, च = and/ also, विशेषाप्रत्यक्षात् = due to lack of perception of special properties (and also), विशेषस्मृतेः = due to the recollection of special memory.

Doubt (arises) due to observable, perception of common properties and / also due to lack of perception of special properties (and also) due to the recollection of special memory.

Doubt arises from the perception (of the object) containing the general properties, the non perception of any special or different properties and also the recollection of special memory, all at once, as one act of thought.

Doubt is defined here very clearly as something arising out of simultaneous occurrence of observable perception of common or general features of an object, lack of observation of special or uncommon features, along with the recall of special memory (simultaneously).

Doubt is a state of mind of confusion, arising out of mixture of some special recollection of the memory with

the observation of common properties of an object, thereby superimposing the memory on to the perception of the object, resulting in erroneous perception on the whole.

दृष्टं च दृष्टवत् ॥ १८ ॥

दृष्टम् = seen, **च** = and, **दृष्टवत्** = as if seen (similar to have been seen).

Seen and as if seen (similar to have been seen)

Doubt is something which is seen and also appears similar to have been seen with uncertainty.

यथादृष्टमयथादृष्टत्वात् ॥ १९ ॥

यथादृष्टम् = as seen, **अयथादृष्टत्वात्** = due to being not as seen, **च** = also.

Due to being as seen and as not seen also.

Doubt is something which appears to have been seen and also as not have been seen.

विद्याऽविद्यातश्च संशयः ॥ २० ॥

संशयः = doubt (arises), **विद्यातः** = due to the knowledge (or science), **अविद्यातः** = due to the ignorance (or nescience), **च** = also.

Doubt arises due to knowledge or science and also due to ignorance or nescience.

Doubt arises due to knowledge and also due to ignorance, both together.

श्रोत्रग्रहणो योऽर्थः स शब्दः ॥ २१ ॥

सः = that is, **शब्दः** = Sabda, **अर्थः** = meaning or signal or

information, यः = which is, श्रोत्रग्रहणः = captured, grasped, or perceived by the ear.

That is Sabda, which is a means or meaning (signal) captured, grasped, or perceived by the ear.

Now the definition of Śabda is being made as the means or meaning (signal) which can be captured, grasped or perceived by the ear. It is important to note that Śabda is defined as artha or meaning or information, or knowledge, which can be received by the ear, along with its meaning as interpreted by the mind.

तुल्यजातीयेष्वर्थान्तरभूतेषु विशेषस्य उभयथा दृष्टत्वात् ॥ २२ ॥

तुल्यजातीयेषु = among the members of homogeneous classes of objects, अर्थान्तरभूतेषु = among the members of heterogeneous classes of objects, विशेषस्य = a specialty / difference, उभयथा दृष्टत्वात् = having been seen in both cases.

Doubt arises with respect to sabda due to its difference (specialty) being observed both amongst the members of homogeneous classes of objects and also among heterogeneous classes of objects.

Doubt arises with respect to Śabda due to its difference (specialty) being observed both amongst the members of homogeneous classes of objects and also among heterogeneous classes of objects.

एकद्रव्यत्वात्र द्रव्यम् ॥ २३ ॥

एकद्रव्यत्वात् = due to being resident in a single substance, न द्रव्यम् = it is not a substance.

Sabda is not substance as it resides in a single substance.

Śabda is being defined as a non-substance, as it resides within one substance (i.e. Ākāśa)

नापि कर्माऽचाक्षुषत्वात् ॥ २४ ॥

न = not, अपि = even, कर्म = motion, अचाक्षुषत्वात् = being not observable to the eye.

(Sabda is) Not even motion, being not observable to the eye (as morning).

Śabda is being defined as not a motion, as it is not visible to the eye. It is important to note that normal sound is motion of air particles. Whereas Śabda is being defined as meaning (Artha) which can be grasped. It is clear that Śabda is 'signal' of modern communication systems. Signal can be transmitted through a medium such as air as sound or even also electromagnetic waves. Śabda is not to be interpreted simply as sound, (as was done wrongly) but as signal, which has some meaning (Artha) or information in it.

गुणस्य सतोऽपवर्गः कर्मभिः साधर्म्यम् ॥ २५ ॥

गुणस्य = (Sabda being) Of guna or quality (category), सतोऽ-पवर्गः = due to (the event of its) speedy destruction, कर्मभिः साधर्म्यम् = resemblance or similarity exists with motion.

Sabda being of guna or quality category due to the event of its speedy destruction, resemblance or similarity exists for sabda with motion.

The resemblance of Śabda with motion is due to the event of its early destruction even though it is actually a quality (Guṇa). The similarity of Śabda with motion is explained here.

सतो लिङ्गाभावात् ॥ २६ ॥

सतः = before its existence, **लिङ्गाभावात्** = due to the absence of an indicative characteristic (of its existence).

Before its existence due to the absence of an indicative characteristic (of its existence)

Śabda does not exist before its utterance or production, due to the absence of any indication of its existence before that. Śabda does not exist before its production. This is being stated here.

नित्यवैधर्म्यात् ॥ २७ ॥

नित्यवैधर्म्यात् = due to being different from the eternal or permanent (it is not permanent).

Due to being different from the eternal or permanent

This is an argument of Śabda being impermanent. Śabda is having properties which are different from those which exist among eternal or permanent entities or Dravyas. It's properties are divergent from the properties present in the eternal or permanent (as it is not existent before its production).

अनित्यश्चायं कारणतः ॥ २८ ॥

च = and also, **कारणतः** = being produced by a cause (as an effect), **अयम् अनित्यः** = (it is) non eternal.

And also being produced by a cause (as an effect), it is not eternal.

Śabda is non eternal, as it is being produced as an effect by a cause. Before such production Śabda does not exist. Therefore, it is non permanent.

न चासिद्धं विकारात् ॥ २९ ॥

न = not, **च** = also, **असिद्धं** = not established, **विकारात्** = due to the modification (in Sabda).

It is not also not established due to the modification (in Sabda).

Due to the modifications existing in the Śabda, it is not established that it is not the effect of a cause i.e. Śabda is an effect of a cause as modifications exist in it.

अभिव्यक्तौ दोषात् ॥ ३० ॥

अभिव्यक्तौ = due to being expressed or revealed, **दोषात्** = due to being defective (Sabda is not eternal).

Due to being expressed or revealed due to being defective (Sabda is not eternal).

Śabda is not eternal, due to the theory that it requires to be revealed or expressed only, (as this theory) has a defect in it.

संयोगाद्विभागात् शब्दात् शब्दनिष्पत्तिः ॥ ३१ ॥

शब्दनिष्पत्तिः = production of sabda takes place, **संयोगात्** = due to the conjunction (of two or more bodies), **विभागात्** = due to the disjunction or division (of one body into many), **च** = and also, **शब्दात्** = from sabda itself.

The production of sabda takes place due to the conjunction (of two or more bodies), due to the disjunction or division (of one body into many) and also from sabda itself.

Śabda is produced either by the conjunction of two or more bodies, or by the disjunction of a body into many bodies, or from Śabda itself.

In modern Science we know that sound can be produced by joining two or more bodies with contact (by impact) or by some kind of decomposition (eg. explosion). Sound can also be produced by another sound. However, Śabda is beyond sound, including sound and its meaning i.e. signal or information.

लिङ्गात्रानित्यः शब्दः ॥ ३२ ॥

च = also, शब्दः = Sabda is, अनित्यः = non eternal or transient, लिङ्गात् = and also due to its indicative characteristic (it is not eternal)

Sabda is non eternal (or transient) also due to its indicative characteristic (it is not eternal)

Śabda is not eternal due to its original indicative characteristic also. All the above are the objections to Śabda being eternal. Now (in the next sūtra) the eternity of Śabda will be proposed.

द्वयोस्तु प्रवृत्त्योरभावात् ॥ ३३ ॥

द्वयोस्तु = of the both (teacher and pupil), प्रवृत्त्योरभावात् = vanishing of the occupations.

Due to vanishing of the occupations of the both (teacher and pupil)

Śabda is eternal, as otherwise the occupation of both the teacher and the pupil will vanish. In other words the process of transmission and reception of knowledge between teacher and pupil is possible only if Śabda is eternal. The transmission of knowledge from one generation to the next is possible if Śabda or meaning is eternal.

प्रथमाशब्दात् ॥ ३४ ॥

प्रथमाशब्दात् = from the word 'the first' (it follows that sabda is eternal).

From the word 'the first' (it follows that Sabda is eternal).

From the word 'the first' it follows that Śabda is eternal.

In the Vedas it is stated that Śabda was existing as 'the first' in the beginning, the primordial sound which was described as Pranava.

The same is mentioned in the Bible as 'In the beginning there was the Word'.

Sabda is normally accepted to have existed before and during the beginning of Creation.

सम्प्रतिपत्तिभावात् ॥ ३५ ॥

च = and also, **सम्प्रतिपत्तिभावात्** = due to the possibility of recognition.

And also due to the possibility of recognition

The eternity of Śabda also follows from the possibilities of its recognition.

सन्दिग्धाः सति बहुत्वे ॥ ३६ ॥

सति = in the event of, **बहुत्वे** = being in plurality, **सन्दिग्धाः** = the dilemma / doubt persists.

In the event of being in plurality the dilemma / doubt persists.

The eternity of Sabda is still in dilemma and doubt. Therefore, the eternity or otherwise or Śabda is not conclusively established. (Arguments of both sides have been

presented in the previous sūtras). Now qualification in Śabda will be discussed.

संख्याभावः सामान्यतः ॥ ३७ ॥

संख्याभावः = the concept of counting in Sabda (or qualification), **सामान्यतः** = exists in general.

The concept of counting in sabda exists in general.

The existence of numbers and counting in Śabda exists in general. This sūtra recognizes the quantification and possible sub-divisions of Śabda. Even though mathematical quantification is not performed in detail, the possibility of the same is being indicated here.

Chapter 3 : Part -I

प्रसिद्धा इन्द्रियार्थः ॥ ११

इन्द्रियार्थः = the objects of senses (or the objects and the senses), **प्रसिद्धः** = are well known.

The objects of senses (or the objects and the senses) are well known.

The objects of senses are well known.

The five intelligent senses ज्ञानेन्द्रिय have their corresponding objects. The eyes have the ability of sight which is indicated by the form/shape/colour (रूप). The ears have the ability to hear which is indicated by Śabda (शब्द) a sound or any kind of vibration. The tongue has the ability of taste (through the taste buds) which is indicated by Rasa (रस). The nose has the ability of smell (गन्ध). The skin has the ability of touch (स्पर्श) As indicated earlier, the first five of the nine dravyas are substances namely Pr̥thivī (पृथिवी), Āpa (आप), Vāyu (वायु), Ākāśa (आकाश) and Teja (तेज) are respectively indicated or observed by the senses as smell, taste, touch, sound and sight.

इन्द्रियार्थप्रसिद्धिरिन्द्रियार्थभ्योऽर्थान्तरस्य हेतुः ॥ २१

इन्द्रियार्थप्रसिद्धः = the universally well-known knowledge of the senses, **हेतुः** = becomes the cause of, **अर्थान्तरस्य** = different meaning / objects, **इन्द्रियार्थभ्यः** = from the objects of the senses.

The universally well-known knowledge of the senses becomes the cause of different meaning/ objects from the objects of the senses.

Due to the Universally well-known nature of the sensory objects, there exists a meaning of the objects other than what is indicated by just sensory objects. The perception of the objective real world is due to the sensory object perception, which is well-known. However, such perception also leads to a perception other than what the sensory objects perceive.

We could interpret this by stating that this sūtra is describing the phenomenon of the perception of the real world in terms of the objects whose identity or meaning substantially differs or exceeds beyond the simple sensory object perception. The possibility of the perception of an objective reality quite different from the simple sensory object perception is being indicated here. While the sensory observations can become the basis of knowledge of things in the real world, the real world actually perceived far exceeds the sensory observations by virtue of the role of higher faculties as mind and intellect in performing inferences beyond the basic simple perceptions of the senses. Sensory observations or direct perception (प्रत्यक्ष) can lead to the perception of the image of the real world, quite different from what was simply observed by senses, due to the mechanisms of inference or projection etc. For example the sensory perception of Moon through the eyes is well-known to be quite different from the understanding or perception of the nature of the Moon through scientific instruments and inferences.

सोऽनपदेशः ॥ ३ ॥

सः = that, अनपदेशः = is not logical.

That is not logical.

The perception of the real world is well-known to be comprising of much greater and exceeding complexity than what is possible with simple direct sensory observations (प्रत्यक्ष). Additional faculties such as memory, habit, inference, extrapolation, projection, imagination etc. lead to a very different perception of the real world (which will be exceedingly complex in comparison with simple sensory perceptions).

कारणाऽज्ञानात् ॥ ४ ॥

अज्ञानात् = due to the lack of knowledge of, कारण = the cause(s) (of the sensory perception).

Due to the lack of knowledge of the Cause(s) (of the sensory perception).

The simple sensory perception of the real world lacks the knowledge of the cause(s) of such perception. The simple perception of the senses cannot be adequately sufficient to identify the cause and effect relationship which is essential for any deeper or more accurate perception or knowledge of the real world. The knowledge of the real world is based upon the inference of the cause(s) which create their effects which are actually perceived by the senses. The sensory perception cannot perceive the cause(s). The knowledge so gained is therefore incomplete.

कार्येषु ज्ञानात् ॥ ५ ॥

ज्ञानात् = knowledge is (only), **कार्येषु** = in the effects.

Knowledge is only in the effects.

The knowledge acquired by sensory perception is limited to the effects (and not the causes of those effects), as those causes cannot be observed by the senses. Those causes can be only inferred, based on these sensory observations with due analysis and inferences to identify them.

अज्ञानात् ॥ ६ ॥

च = also, **अज्ञानात्** = due to ignorance.

Also due to ignorance.

The lack of knowledge is also due to ignorance. The sensory objects are based on ignorance. The sensory observation of an object by itself does not carry or contain any knowledge in it.

अन्यदेव हेतुरित्यनपदेशः ॥ ७ ॥

एव = Only, **अन्यत्** = some other thing is, **हेतुः** = the Cause, **इति** = the above statement, **अनपदेशः** = not logical.

Only some other thing is the Cause. The above statement is not logical

The Cause is something other than the Effect itself. Therefore, a Cause which is perceived same as Effect is not a Cause at all.

अर्थान्तरं ह्यर्थान्तरस्यानपदेशः ॥ ८ ॥

अर्थान्तरम् = another means, **हि** = verily can be, **अनपदेशः** = not the cause, **अर्थान्तरस्य** = of another cause.

Another means verily can be not the cause of another cause.

Another means cannot become the means of some other means - this is an objection.

Although an indicative characteristic is quite different from that which it indicates, still they are not wholly unconnected. There are various possible relationships which are being explained in next sūtra.

संयोगि समवायेकार्थसमवायि विरोधि च ॥१॥

संयोगि = one which has the conjunction (relationship), **समवायि** = one which has the inherence (relationship), **एकार्थसमवायि** = one in which has the inherence (relationship) existing in one meaning only and any other relationship in any other meanings - the singular inherent, **विरोधि** = the opposite or the contradiction, **च** = also.

The conjunct, the inherent, the singular inherent, the contradict, are all various forms of indications of inference.

The relationships can be of various categories or types: the conjunct, the inherent, the singular inherent, the contradiction or opponent. Any two entities or objects can be related to each other in any of these forms of relationships.

कार्यं कार्यान्तरस्य ॥ १० ॥

कार्यम् = the effect, **कार्यान्तरस्य** = alternate effect.

The effect and alternate effect.

A cause can have not only one effect, but can have alternate effects also.

विरोध्यभूतं भूतस्य ॥ ११ ॥

विरोधि = the opposite, **च** = and, **अभूतम्** = nonexistent, **भूतस्य** = (are the indications) of the existent.

The opposite and nonexistent (are the indications) of the existent.

An existent entity can be known through its opposite. The opposite can be a nonexistent itself, in addition to be a contradiction to the existent.

भूतमभूतस्य ॥ १२ ॥

अभूतस्य = of that which had not taken place is an indication of, **भूतम्** = that which has taken place.

Of that which had not taken place is an indication that which has taken place.

In the same logic as above some event which had not taken place can be the indication of the opposite i.e. the event having taken place.

भूतो भूतस्य ॥ १३ ॥

भूतः = that which has taken place is an indication, **भूतस्य** = of that which had taken place.

That which has taken place is an indication of that which had taken place.

It is common sense that an event that had taken place is an indication of what has actually taken place.

प्रसिद्धिपूर्वकत्वादपदेशस्य ॥ १४ ॥

प्रसिद्धिपूर्वकत्वात् = due to being a well-known precedent, **अपदेशस्य** = of the inference.

Due to being a well-known precedent of the inference.

The above mentioned are valid indications because the indicative characteristics of an inferential mark or indication is that it is preceded by the recollection of the Universal relation of itself and that of which it is an indication.

अप्रसिद्धोऽनपदेशोऽसन् सन्दिग्धश्चानपदेशः ॥ १५ ॥

अप्रसिद्धः = not well-known, not universal, not known or not proven, **अनपदेशः** = that which cannot be inferred, **सन्दिग्धः** = ambiguous or doubtful, **च** = and (all above), **असन्** = are/ were, **अनपदेशः** = cannot be inferred - are all false indications.

Not well-known, not universal, not known or proven, that which cannot be inferred, ambiguous or doubtful and (all above) are/ were cannot be inferred. Are all false indications.

Inference is not possible in all the three cases: a) unknown (unproven); b) ambiguous or doubtful; c) cannot be inferred. The examples of the above categories where inference is not possible will be explained below.

यस्माद्विषाणी तस्मादश्वः ॥ १६ ॥

यस्मात् = from which ground (it is), **विषाणी** = having horns, **तस्मात्** = from the same ground, **अश्वः** = it is a horse.

From which ground (it is) having horns from the same ground it is a horse.

The statement 'it is a horse because it has horns' is a false inference (because by common knowledge horses do not have horns).

यस्माद्विषाणी तस्माद्‌गौरिति चानेकान्तिकस्योदाहरणम् ॥ १७ ॥

यस्मात् = from which ground (it is), विषाणी = having horns, तस्मात् = from the same ground (it is), गौः = cow, इति च = and the above, उदाहरणम् = the example, अनेकान्तिकस्य = of multiple or sided multi faceted indication.

From which ground (it is) having horns from the same ground (it is) cow. The above is the example of multiple sided indication.

'As it has horns it is a cow' is an example of multiple sided or multifaceted indication.

आत्मेन्द्रियार्थसन्निकर्षाद्यनिष्पद्यते तदन्यत् ॥ १८ ॥

यत् = that (knowledge) which, निष्पद्यते = is produced, आत्मेन्द्रियार्थसन्निकर्षात् = due to the conjunction of the self and the senses, तत् = that, अन्यत् = is the other one.

That (knowledge) which is produced due to the conjunction of the self and the senses that is the other one.

That knowledge which is produced from the conjunction of self and the senses is the other (other than false indication). When the self is in conjunction with the senses, knowledge generation takes place. This could be knowledge other than false indications.

प्रवृत्तिनिवृत्ती च प्रत्यगात्मनि दृष्टे परत्र लिङ्गम् ॥ १९ ॥

प्रवृत्तिनिवृत्ती च = action and inaction, दृष्टे = observed (seen), प्रत्यगात्मनि = in one's own self, परत्र = elsewhere (outside) also, लिङ्गम् = is the indicative characteristic sign or proof.

Action and inaction observed (seen) in one's own self (or) elsewhere (outside) also is the indicative characteristic sign or proof.

Observing action/ inaction in one's own self is the proof of similar observation elsewhere i.e. in otherselves. Whatever is seen in one's own self is also true inside other selves outside. This indicates the identity or similarity of multiple selves. In the later sutras the self is shown to exist in multiple numbers.

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Chapter - 3 : Part -II

आत्मेन्द्रियार्थसन्निकर्षं ज्ञानस्य भावोऽभावश्च मनसो लिङ्गम् ॥ ११

लिङ्गम् = the indicative characteristic, **मनसः** = of mind (are),
भावः = the existence, **च** = and, **अभावः** = the non existence, **ज्ञानस्य**=
of knowledge (arising), **आत्मेन्द्रियार्थसन्निकर्ष** = in the conjunction of
Self with the senses.

**The indicative characteristic of mind (is) the existence (and)
the non existence of knowledge (arising) in the conjunction of
self with the senses.**

Now the indicative characteristic or proof for the existence of the mind is being presented as: The existence and non existence of knowledge, arising in the conjunction of Self with the senses.

'When the contact or conjunction of senses with the self happens, the knowledge arises' - this is the indication of existence of mind. The fact that the knowledge arises is the proof that the mind exists. Mind is the agency due to which the knowledge arises, due to the conjunction of the self with senses (without mind existing knowledge cannot be arising, even though the self is an conjunction with the senses, as it happens in the case of deep sleep).

This description indicates clearly the origin of knowledge. Knowledge of the real world arises out of the sensory observations, in conjunction with the self. But the active agency of knowledge is the Mind. The Mind is the agency

which is responsible for the perception of the knowledge of the real world from the sensory observations, in the presence and conjunction of the Self.

तस्य द्रव्यत्वनित्यत्वे वायुना व्याख्याते ॥ २ ॥

तस्य द्रव्यत्वनित्यत्वे = in being a substance (or material entity) and in being eternal (or permanent), **व्याख्याते** = (Mind) is commented, **वायुना** = along (together) with Vayu.

In being a substance (or material entity) and in being eternal or permanent, Mind is commented along with Vayu.

Being invisible, Mind is being compared with Vāyu (which is also invisible). As Vāyu is a Dravya and also permanent or eternal (नित्य) so is Mind (is a Dravya and permanent नित्य). As we all know, Mind is eternal and is a fundamental entity. It is interesting to note that mind is being identified as a fundamental entity which is eternal, on equal footing with other fundamental substances such as Matter, Energy, Space and Time of Classical Physics.

The Classical Physics could not accept Mind or Self as fundamental entities. But the Quantum Physics has recognized the need for the existence of 'observer' who can be viewed to be comprising of the Mind and the Self, together.

प्रयत्नायौगपद्याज्ञानायौगपद्याद्वैकम् ॥ ३ ॥

एकम् = mind is only one (in each organism or body or individual), **प्रयत्नायौगपद्यात्** = due to non simultaneity of the effort, **ज्ञानायौगपद्याद्वा** = and also due to non simultaneity of knowledge (acquisition) or volition.

Mind is only one (in each organism or body or individual), due to the non simultaneity of the effort and also due to the non simultaneity of knowledge (acquisition) or volition.

Mind is only one (in an individual) due to the non simultaneity of volition or knowledge acquisition and also due to the non simultaneity of cognition.

An individual can have only one mind. This is clear from the fact that an individual can acquire knowledge only one at a time and not simultaneously. Different knowledge streams cannot be produced by the mind simultaneously. (Even though in some advanced states of mind, multiple streams of knowledge can be acquired, as also in the case of occult powers of the mind, extraordinary perceptions can also be noticed).

**प्राणापाननिमेषोन्मेषजीवनमनोगतीन्द्रियान्तरविकाराः
सुखदुःखेच्छाद्वेषप्रयत्नाश्चात्मनो लिङ्गानि ॥ ४ ॥**

आत्मनो लिङ्गानि = indicative characteristics of the self are, **प्राणापान** = inhalation and exhalation, **निमेषोन्मेष** = the closing and opening of eye lids, **जीवन** = the movement of the mind, **मनोगति** = the existence of life, **इन्द्रियान्तरविकाराः** = the changes or modifications of the various senses, **सुखदुःख** = (feelings of) pleasure and pain, **इच्छाद्वेष** = (feelings of) desire and hatred, **प्रयत्नाश्च** = and also effort (s).

Indicative characteristics of the Self are inhalation and exhalation, the closing and opening of the eye lids, the existence of life, the movement of the mind, the changes or modifications

of the various senses, (feelings of) pleasure and pain (feelings of) desire and hatred and also effort(s).

Now the proofs or indicative characteristics of the self are being listed: inhalation and exhalation, closing and opening of the eyelids, the existence of life (in the body), the movement of the mind, the modification of the senses (with their observations), the feelings of pleasure and pain, desire and hatred and also efforts.

By virtue of all the above indicated proofs we have to accept the existence of the self, even though Classical Physics has not addressed the existence of the self. (In Quantum Physics the role of the observer was accepted as an essential requirement).

तस्य द्रव्यत्वनित्यत्वे वायुना व्याख्याते ॥ ५ ॥

तस्य द्रव्यत्वनित्यत्वे = in being a substance and in being eternal or permanent (self), **व्याख्याते** = are commented, **वायुना** = together with Vayu.

In being a substance and in being eternal or permanent, the self is commented together with Vayu.

Being invisible, the self is being compared with Vāyu (which is also invisible). As Vāyu is a Dravya and also permanent or eternal (नित्य) so is the self (dravya and permanent (नित्य) As we all know, self is eternal and is a fundamental entity. It is interesting to note that self is being identified as a fundamental substance or material entity which is eternal, on equal footing with other fundamental substances such as Matter, Energy, Space and Time of Classical Physics.

Classical Physics could not accept self or mind has fundamental entities. But the Quantum Physics has recognized the need for the existence of 'observer' who can be viewed to be comprising of the mind and the self, together.

Now (in the next few sūtras) the objections to the existence of the self are being presented and later being refuted or nullified.

यजदत्त इति सन्निकर्षं प्रत्यक्षाभावाद्
दृष्टं लिङ्गं न विद्यते ॥ ६ ॥

दृष्टं लिङ्गं न विद्यते = no visible indicative characteristic or proof can be seen in the statement, **यजदत्त इति सन्निकर्षं** = in the conjunction of a person by name "Yajnadatta" being identified with his body, **प्रत्यक्षाभावात्** = in the absence of the direct sensory perception (of the self).

No visible indicative characteristic or proof can be seen in the statement in the conjunction of a person by name Yajnadatta being identified with his body, in the absence of the direct sensory perception (of the self)

Upon this perception of the body, there is no indication or proof of the self (as in the perception) 'he is Yajñadatta'. The perception of the body by the senses does not necessarily imply the existence of the self.

ONE MORE OBJECTION IS BEING PRESENTED

सामान्यतो दृष्टाद्वाविशेषः ॥ ७ ॥

सामान्यतः = of common, **दृष्टात्** = (as observed observation), **च** = and also, **अविशेषः** = not special (observation).

Of common observation and also not special (observation).

The existence of the self cannot be observed, either in general, as a common observation or in the special case as a special observation.

ONE MORE OBJECTION

तस्मादागमिकः ॥ ८ ॥

तस्मात् = therefore, आगमिकः = (the existence of the self) is derived from the Veda.

Therefore (the existence of the self) is derived from the Veda.

Therefore the existence of the Self can be proved only on the basis of the statements made in the Veda.

While it is not possible to observe (generally or specially) the existence of the Self, it can be based on the Veda itself which can act as the proof of existence of the Self.

THIS IS ONLY AN OBJECTION, TO BE REFUTED

अहमिति शब्दस्य व्यतिरेकान्लागमिकम् ॥ ९ ॥

नागमिकम् = not (simply) to be derived from the Veda (Agama),
अहमिति = 'I' this, **शब्दस्य व्यतिरेकात्** = word being not applied to any other object.

Due to the non applicability of the word 'I' to any other object and being applicable only to the self - (the self is) not simply to be derived from the Veda (Agama).

Though the Veda indicates the applicability of 'I' to the self, it is not the only reason to accept self. Due to the non-applicability of the word 'I' to any other object except the self, the self has to be accepted to exist.

यदि वृष्टमन्वक्षमहं देवदत्तोऽहं यजदत्त इति ॥ १० ॥

यदि = if, वृष्टमन्वक्षम् = we can clearly see that, देवदत्तोऽहम् = “I am Devadatta”, अहं यजदत्तः = “I am Yajnadatta”, इति = as above.

If we can clearly see that “I am Devadatta”, “(I am) Yajnadatta”, as above.

If there are such perceptions as - 'I am Devadatta', 'I am Yajñadatta', then there is no need for inference. However, nobody is actually feeling 'I am Devadatta', or 'I am Yajñadatta'. Everyone feels the existence of the self as himself or herself and not as Devadatta or Yajñadatta, which are only names ascribed to the self.

In this sūtra the nature of the self as pure Awareness or Consciousness is being clearly brought out. The identifications of the names or other attributes of the self are only externally attached. Nobody actually feels the identity with such attributes. Everyone feels the identity with pure self only.

वृष्ट आत्मनि लिङ्गे एक एव वृढत्वात् प्रत्यक्षवत् प्रत्ययः ॥ ११ ॥

वृष्ट आत्मनि लिङ्गे = in the indication of the visible or perceived self, एक एव = one and only one, वृढत्वात् = due to the strength of grounds of, प्रत्ययः = definite knowledge, प्रत्यक्षवत् = like perception.

In the indication of the visible or perceived self, one and only one, due to the strength of grounds of definite knowledge.

The existence of the self is based on as strong proof, similar to - direct perceptions - this perception of the self or the knowledge of the existence of the self is definite knowledge. Multiple proofs can be shown for the existence

of the self. With the strong definite knowledge (of the self), the existence of the self can be proved.

OBJECTION

देवदत्तो गच्छति यज्ञदत्तो गच्छतीत्युपचाराच्छरीरे प्रत्ययः ॥ १२ ॥

देवदत्तो गच्छति यज्ञदत्तो गच्छतीत्युपचारात् = Devadatta goes', 'Yajnadatta goes' - due to these references being, प्रत्ययः = definite knowledge, शरीरे = upon the body.

'Devadatta goes', 'Yagnadatta goes'- these references being definite knowledge upon the body.

Objection

Observation such as 'Devadatta goes', 'Yajnadatta goes' are referring definitely to the body only and not the self.

सन्दिग्धस्तूपचारः ॥ १३ ॥

तु = however, उपचारः = general (worldly) knowledge, सन्दिग्धः = is in doubt.

However, general (worldly) knowledge is in doubt.

This is one more objection expressed as a doubt. It is not definite but it is doubtful. The worldly knowledge of the, self is in doubt; whether the self is only body or the self (is by itself).

ASSERTION OF EXISTENCE OF THE SELF

अहमिति प्रत्यगात्मनि भावात् परत्राभावादर्थान्तरप्रत्यक्षः ॥ १४ ॥

भावात् = due to the existence (of the self), अहम् = the feeling as 'I', प्रत्यगात्मनि = in the self which is being directly perceived (by everyone), परत्राभावात् = due to the absence (of the feeling as

'I') elsewhere (anywhere else), अर्थान्तर् = a meaning other than body, प्रत्यक्षः = is directly perceived or is observable.

Due to the existence (of the self) the feeling as 'I' in the self which is being directly perceived (by everyone), due to the absence (of the feeling as 'I') elsewhere (anywhere else), a meaning other than body is directly perceived or is observable.

The feeling of 'I' is found to exist in the self, which is directly perceptible or can be experienced (as 'I') and not in the body and not anywhere else. Therefore, self exists.

NEGATION OF OBJECTION

देवदत्तो गच्छतीत्युपचारादभिमानात्तावच्छरीर-
प्रत्यक्षोऽहङ्कारः ॥ १५ ॥

देवदत्तो गच्छतीत्युपचारात् = due to the general (worldly) statement 'Davadatta goes' etc., अभिमानात् = due to ego, तावत् = till then, शरीरप्रत्यक्षः = directly observable body, अहङ्कारः = ego.

All the statements such as 'Davadatta goes' etc. are referring only the body and not to the self.

All the statements such as 'Devadatta goes' etc. are referring only the body and not to the, self. (Therefore the objection is overruled).

सन्दिग्धस्तूपचारः ॥ १६ ॥

तु = however, उपचारः = general (worldly) knowledge or practice, सन्दिग्धः = is doubtful.

However general (worldly) knowledge or practice is doubtful.

In the normal worldly practice of statements it is doubtful whether 'I' refers to the body or to the self. In statements such as 'I am weak', 'I am strong' it is not clear whether 'I' refers to the body or to the self. In statements such as 'I am happy', 'I am sorry' etc. it is clear that something other than the body is being referred (as body cannot be happy or sorry). This transference between the body and the, self is doubtful and ambiguous.

CLARIFICATION

न तु शरीरविशेषाद् यज्ञदत्तविष्णुमित्रयोर्जनं विषयः ॥ १७ ॥

तु = however, न = it is not that, ज्ञानम् = knowledge, विषयः = (is the) subject, शरीरविशेषाद् यज्ञदत्तविष्णुमित्रयोः = due to the existence of (multiple) different bodies as of 'Yajnadatta, Vishnumitra' etc.

However, it is not that the knowledge (is the) subject due to the existence of (multiple) different bodies as of 'Yajnadatta, Vishnumitra' etc.

As we perceived the differences of various different bodies, the thought or the knowledge of Yajnadatta, Vishnumitra is referring to different individuals. Therefore, consciousness or self is not an attribute of the body.

The differences between Yajnadatta and Vishnurnitra are not bodily differences alone. The feelings such as 'I am happy, I am sorry, I am great, I am poor' etc. do not come about just from the body alone. Knowledge does not depend upon the body alone. All such feelings as 'I am happy' etc. do not describe the body. The notion of the self (or 'I') is happy etc., exists quite independent of the body.

It is due to the ignorance and the delusion that the self is equated with its instruments such as the body, colour, feelings, ego etc. if it is not so, then the qualities of the body will never be ascribed to the Self.

The feelings such as happiness etc. are not the qualities of the body.

Even though the bodies are different, the feelings of happiness, sorrow etc. are being seen as different from body to body. Therefore, these feelings are not the properties of the body, but are the properties of something else. That is the Self or 'I'.

अहमिति मुख्ययोग्याभ्यां शब्दवद्व्यतिरेकाव्यभिचारा-
द्विशेषसिद्धेनागमिकः ॥ १८ ॥

अहमिति = the knowledge 'I am', **मुख्ययोग्याभ्याम्** = along with important attributes, **नागमिकः** = is not (necessarily or only) revealed by the Vedas, **व्यतिरेकाव्यभिचारात्** = due to invariable divergence, **विशेषसिद्धेः** = proved in particular, **शब्दवत्** = similar to Sabda.

The knowledge 'I am' (alongwith important attributes) is not (necessarily or only) revealed by the Vedas, due to the invariable divergence proved in particular, similar to Sabda.

The existence of the self is not proved only by the revelation by the Vedas. Since the self is proved in particular (विशेषः) by the innate as well as sensible cognition in the form of 'I' accompanied by the invariable divergence of such cognition from all other things in the world (as in the case of Śabda).

Just as the quality Śabda is present only in Ākāśa and not in other entities, so also the feelings of 'I' (am happy etc.) cannot be found in the body. This feeling of 'I am happy' (just as Śabda in Ākāśa) should be present in a different entity i.e. self.

Thus self has to exist, independent of the body.

OBJECTION

सुखदुःखज्ञाननिष्पत्त्यविशेषादैकात्म्यम् ॥ १९ ॥

निष्पत्ति = the production of, **सुख** = happiness, **दुःख** = sorrow, **ज्ञान** = knowledge, **अविशेषात्** = due to not being special (due to being common or in general), **ऐकात्म्यम्** = oneness of the self (is indicated).

The production of happiness, sorrow, knowledge due to not being special (due to being common or general) oneness of the self (is indicated).

The objection is that the qualities or feelings such as happiness, sorrow, knowledge, ignorance etc. exist everywhere i.e. they are found in general in all selves. Therefore, there should exist only one Self.

A clarification is being given in the next sūtra.

CLARIFICATION AND ASSERTION

व्यवस्थातो नाना ॥ २० ॥

व्यवस्थातः = due to the established or ground reality, **नाना** = multiple (selves).

Due to the established or ground reality, multiple (selves) exist.

However, on the grounds of the well-known established ground reality, there exist multiple selves and not only one single self. Different individual selves are simultaneously experiencing different qualities of happiness, sorrow, knowledge, ignorance etc. Therefore, there exist multiple (नाना) selves.

शास्त्रसामर्थ्याच्च ॥ २१ ॥

च = and also, शास्त्रसामर्थ्यात् = due to the efficacy of the Sastra (standard body of knowledge).

And also due to the efficacy of the Sastra (standard body of knowledge).

It is possible to establish that there exist multiple selves, on the grounds of the efficacy of standard body of knowledge or Śāstra i.e. in addition to the ground reality of well-known knowledge of the existence of multiple selves, the standard knowledge sources as Sastras also indicate the existence of multiple selves.

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Chapter - 4 : Part -I

ATOMIC THEORY

सदकारणवित्यम् ॥ ११।

सत् = Existence (the essence of material existence), अकारणवत् = which has no cause or is causeless i.e. born or exists on its own, without a cause, **नित्यम्** = is eternal or permanent.

Existence (the essence of material existence) which has no cause or causeless i.e. born or exists on its own, without a Cause and is eternal or permanent.

Sat or Existence is eternal and it is causeless.

As eternal existence has no cause to create it, it is always there i.e. permanent (नित्य).

This notion of Existence appears to be identical to the notion of Brahman in Vedānta.

Sat is the first of the three: Sat, Cit, Ānanda.

Sat is Pure Existence or Absolute Existence, the essence of all material reality.

This is the same as the Absolute (material) Reality in Physics, which has two facets: Matter and Energy.

The Brahman of Vedānta is same as the Sat of Vaiśeṣika, is the same entity which is Absolute Reality of Physics, whose two facets are Matter and Energy in Relativistic Physics.

Clearly Sat is eternal and is causeless.

In the previous chapter the detailed definitions of substances (or material entities) as Pr̥thivī, Āpa, Vāyu etc. have been completed. In this chapter their cause is being discussed. Vaiśeṣika expounded the Atomic Theory wherein indivisible atoms are identified as the ultimate building blocks of all Dravyas as above. The word Sat is also representing the ultimate reality or the ultimate building blocks i.e. atoms themselves.

तस्य कार्यं लिङ्गम्॥ २॥

तस्य कार्यम् = its effect, लिङ्गम् = is its indicative characteristic or proof (for it).

Its Effect is its indicative characteristic or proof (of its existence).

The Effects of atoms are the myriad forms of manifest Nature - the manifest forms of Pr̥thivī, Āpa and Vāyu etc. all caused by the atomic units.

The indication of Sat or Pure Existence is its Effect.

The Effect of Sat or Pure Existence is the whole Universe, with all its material forms and energy interactions i.e. all forms of Matter and all forms of Energy.

The Effect is the indicative characteristic or proof of the existence of its cause. The Universe which is the Effect, is an indicative characteristic of its cause, Sat (Pure or Absolute Existence). We can also take Sat to be represented by the atoms, the ultimate building blocks of the Universe, it is being indicated here that the manifest Universe is an effect of the cause, Sat.

कारणभावात् कार्यभावः ॥ ३ ॥

कार्यभावः = absence of the Effect, **कारणभावात्** = is due to the absence of the Cause.

Absence of the Effect is due to the absence of the Cause.

If there is no Cause, then there cannot be any Effect.

This is the Universal Causality Principle, the bedrock of Logic and Science. The Universe is the Effect of the Cause 'Sat' (as atoms).

The clear statement of the Causality Principle here demonstrates the unalloyed scientific temper of Vaiśeṣika. There is no scope for any blind faith, superstition, religious bigotry in Vaiśeṣika, which proclaims its affiliation to the Vedas. Thus, in Vaiśeṣika we have the roots of Hetuvāda or Rationalistic school of thought, which is the basis for all science, yet affiliated to the Vedas. Therefore, Vedas are also scientific in their essential nature.

OBJECTIONS

अनित्य इति विशेषतः प्रतिषेधभावः ॥ ४ ॥

अनित्यः = non eternal, non permanent or temporary, **इति** = this (as above), **प्रतिषेधभावः** = (is) a contradiction, **विशेषतः** = of the particular or specialized.

Non eternal, non permanent or temporary - this is a contradiction of the particular or specialized.

- Such expressions as 'non eternal' can be explained as negation or the denial of the particular or specialized (Viśesa).

'Non eternal' - such intuition or statement can be accounted for, only as a negation of the eternal i.e. the atomic units. This sūtra establishes the eternity of the atoms. The concept behind using the word 'non eternal' is that the denial of the produced objects is not negated. Therefore, it follows that there are objects which are meant for the denial of the produced objects - those objects are the atoms.

अविद्या ॥ ५ ॥

अविद्या = ignorance (of the atoms).

Ignorance.

It is ignorance to think that the ultimate Viśeṣa or particular is non eternal, because since the permanent material world (made of atoms) cannot be caused by the non permanent entities.

In the previous sūtra the particular entities (such as atoms) which are non eternal have been stated to be the cause of the material world - an impossibility, the non permanent atoms cannot cause the permanent material world. Therefore, the Visesha or the particular (atoms) have to be permanent. Thus objection can be over ruled.

Atoms cannot be perceived by the sense organs (this is ignorance). Vaiśeṣika brings out the atomic theory of matter, which continued till 18th Century AD. Until the structure of the atom was proposed, the atoms were recognized to be the ultimate building blocks of the material world and evidently the atoms were permanent (नित्य).

महत्यनेकद्रव्यवत्त्वात् रूपाच्चोपलब्धिः ॥ ६ ॥

महति = in Mahat (in the Universe), **अनेकद्रव्यवत्त्वात्** = due to the existence of multiple substances or material entities, **च** = and also, **रूपात्** = due to multiple forms/shapes/colours, **उपलब्धिः** = attainment or formation (is possible).

In Mahat (in the Universe) due to the existence of multiple substances or material entities and also due to multiple forms / shapes / colours, attainment or formation (is possible).

In the Universe the multifarious forms of substances or material entities are obtained.

In other words various forms/shapes/ colours of material objects are obtained or formed from the multiple substances or material entities, all caused by the original (Sat).

Sat or Pure Existence takes multifarious forms as substances with various forms/shapes/colours i.e. the Universe is formed out of Sat or Pure Existence (Brahman in Vedānta). Atoms take different forms of agglomerations.

Atoms cannot be perceived. Perception is possible only for those objects which have perceivable dimensions or measure (परिमाण) and have a form/shape/colour (रूप).

सत्यपि द्रव्यत्वे महत्त्वे रूपसंस्काराभावाद्वायोरनुपलब्धिः ॥ ७ ॥

सति = if so, **अपि** = then, **वायोः** = for Vayu, **रूपसंस्काराभावात्** = due to the absence of the trait or habit, form shape / colour, **अनुपलब्धिः** = not obtained (perception not possible), **द्रव्यत्वे** = in being a substance or material entity, **महत्त्वे** = in Mahat (being large in Universe).

In spite of being a large substance (or material entity), Vayu does not get perceived i.e. cannot be observed directly due to its lack of form / shape/ colour.

Invisibility is not a ground for non existence, as in the case of Vāyu. Vāyu is invisible but it has existence. So also the atoms are invisible but they exist.

अनेकद्रव्यसमवायात् रूपविशेषाच्च रूपोपलब्धिः ॥ ८॥

अनेकद्रव्यसमवायात् = by the Inherence of many substances (dravyas), **रूपविशेषाच्च** = also by the special or emphasised roopa or form/colour/shape (of its own), **रूपोपलब्धिः** = a particular roopa or form/colour/shape will be formed.

A particular roopa or form/colour/shape will be formed by Inherence (of roopa) of many substances (dravyas) and also by the special or emphasised roopa or form/colour/shape (of its own).

This means that a form/shape/colour of an object will be the result of combination or synthesis of the multiple Substances (such as Pr̥thivī or Āpa or Vāyu, etc.) with which the object is composed and also, in addition due to the special form/color/shape of the object itself. Since any object cannot be a pure form of a single dravya but is always a combination of many dravyas, the form/shape/colour of the object will naturally be formed as the the combined result of all the the form/colour/shape of the dravyas of which it is composed,in addition to having its own special characteristics of form/shape/colour.

तेन रसगन्धस्पर्शेषु ज्ञानं व्याख्यातम्॥ ९॥

तेन = by that, **ज्ञानम्** = knowledge, **व्याख्यातम्** = is described,
रसगन्धस्पर्शेषु = among taste, smell and touch.

By that knowledge is described among taste, smell and touch.

By that (argument) it is to be taken as described for other perceptions of knowledge also in taste, smell or touch. (As for *Vāyu* form/shape/colour do not exist, so also for the other substances for taste, smell and touch also).

तस्याभावादव्यभिचारः॥ १०॥

तस्याभावात् = due to its absence, **अव्यभिचारः** = no violation.

Due to its absence no violation.

There is no violation (of perceptibility) due to lack of form shape/colour etc. Even though such perceptible indications are absent, the atoms do exist.

**संख्या: परिमाणानि पृथक्त्वं संयोगविभागौ परत्वापरत्वे
कर्म च रूपिद्रव्यसमवायात् चाक्षुषाणि॥ ११॥**

संख्या: = numbers or counting, **परिमाणानि** = measures, **पृथक्त्वम्** = separateness, **संयोगविभागौ** = conjunction and disjunction, **परत्वापरत्वे** = being next and being previous (or proximity and being remote), **च** = and, **कर्म** = motion, **चाक्षुषाणि** = (all these are) observable or perceptible by the eye, **रूपिद्रव्यसमवायात्** = due to their inherence among the objects having forms/shape/colour.

Numbers or counting, measures, separateness, conjunction and disjunction, being next and being previous and motion (all

these are) observable or perceptible by the eye due to their inherence among the objects having forms/shape/colour.

Being inherent among the objects which have form/shape/colour the qualities of numbers, measures, separateness, conjunction and disjunction, being next and being previous and motion are all perceptible to the eye.

A substance which is perceptible has attitudes or qualities as described above.

Other qualities such viscosity (स्नेह) and velocity (वेग) can also be added to the above list of qualities.

अरूपिष्वचाक्षुषाणि ॥ १२ ॥

अरूपिषु = among those which do not have form/shape/colour, अचाक्षुषाणि = (they) are not observable or perceptible to the eye (not visually perceived).

Among those which do not have form /shape/ colour they are not observable or perceptible to the eye (not visually perceived).

Among substances not possessing form/shape/colour it is not possible to observe. Then they are not objects of visual perception.

एतेन गुणत्वे भावे च सर्वन्द्रियज्ञानं व्याख्यातम् ॥ १३ ॥

एतेन = by this, भावे = in existence, गुणत्वे = in being qualities, च = also, सर्वन्द्रियज्ञानम् = knowledge based on all sensory perceptions, व्याख्यातम् = is to be described.

By this in existence in being qualities, knowledge based on all sensory perceptions is to be described.

By this (above logic extended further) all sensory perception based observations are to be described as to be based upon the existence of the qualities respectively i.e. existence to all qualities is perceptible to all senses according their sources i.e. depending on presence of specific quality (गुण) the concerned sensory organ can make the observation (as colour for eye, sound for ear etc.).

At the time of perception of the substances the qualities inherent in them are perceived. So also during the perception of qualities the existence and also the qualities are perceived. Thus, these two types of perceptions have to be distinguished separately.

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Chapter - 4 : Part -II

तत् पुनः पृथिव्यादि कार्यद्रव्यं त्रिविधं
शरीरेन्द्रियविषयसंज्ञकम् ॥ ११।

पुनः = again, तत् = that, पृथिव्यादि कार्यद्रव्यम् = substances or material entities such as Prithivi etc. which are the effects, त्रिविधम्= are of three categories (or levels), शरीरेन्द्रियविषयसंज्ञकम् = named as bodily, sensory and sensory object based.

Again, that substances or material entities such as Prithivi etc. which are the effects, are of three categories (or levels) named as bodily, sensory and sensory object based.

The substances or material entities as Pr̥thivī etc. which are the effects of the cause which is Sat (सत्) are classifiable into three categories a) bodily b) sensory c) based on sensory objects. In other words the substances are seen as effects of Sat at three levels: body level, sensory level, sensory object level. In each of these levels the substances (as Pr̥thivī) can be felt or perceived separately. This is clear from the experience and from the perception. In each of these three levels analysis can be performed, based on the perceptions as is well-known. In modern Science most of the experiments and deductions are performed at the sensory object level only. In personal life the perceptions at sensory level and body level can be experienced distinctly.

प्रत्यक्षाप्रत्यक्षाणां संयोगस्याप्रत्यक्षत्वात्
पञ्चात्मकं न विद्यते ॥ २१।

प्रत्यक्षाप्रत्यक्षाणाम् = of all the observable and unobservable, संयोगस्याप्रत्यक्षत्वात् = due to the inability to observe the conjunctions (of substances), पञ्चात्मकं न विद्यते = nothing exists which is made of five substances.

Of all the observable and unobservable (entites) due to the inability to observe the conjunctions (of substances) nothing exists which is made of five substances.

Due to the invisibility of conjunction, nothing exists as made up of five substances among all the observable and unobservable entities.

This Sūtra is interpreted as a description of the human body. The body is stated to be composed of the five substances (Dravya) - Pṛthivī, Āpa, Vāyu, Teja and Ākāśa. Since some of them (Ākāśa and Vāyu) and their conjunctions are imperceptible, the body also should be imperceptible. However, the body is perceptible. Therefore, should it be inferred that the body is not composed of all the five substances.

गुणान्तराप्रादुर्भावाच्च न त्र्यात्मकम्॥ ३॥

गुणान्तराप्रादुर्भावाच्च = also due to not being born out of alternate qualities, न त्र्यात्मकम् = (they are) not made of three substances.

Also, due to not being born out of alternate qualities, they are not made of three substances.

Also, due to the reason of the non appearance of alternate qualities it is not possible to have entities composed

of three visible substances (Pr̥thivī, Āpa, Teja). If the body would be composed of only three visible Dravyas (Pr̥thivī, Āpa and Teja) then only their qualities should be visible. But alternate qualities are also visible. Therefore, it is not correct to state that the body is composed only of the three visible Dravyas (Pr̥thivī, Āpa and Teja).

The above two sūtra are indicating the illusory nature of observable entities.

अणुसंयोगस्त्वप्रतिषिद्धः ॥ ४ ॥

तु = however, अणुसंयोगः = conjunction of atoms, अप्रतिषिद्धः= cannot be ruled out.

However, conjunction of atoms cannot be ruled out.

In spite of the illusory nature of the observable objects, the existence of conjunction of atoms to form the world cannot be ruled out.

In this sūtra it is clearly being brought out that the Universe is made up of atoms in conjunction.

The atomic nature of the world is being emphasized. All other material forms are shown to be untrue or temporary. Only the atomic agglomerations are being accepted to be the composition of the perceptible world (all other observable entities are being dismissed as untrue). Human body also is composed of atoms only.

तत्र शरीरं द्विविधं योनिजमयोनिजज्य ॥ ५ ॥

तत्र = there, शरीरम् = the body, द्विविधम् = is of two categories, योनिजम् = born out of sexual reproduction, अयोनिजज्य = and also born out of asexual reproduction.

There the body is of two categories: born out of sexual reproduction and born out of asexual reproduction.

The real world (with composition of atoms) comprises of bodies of two categories: a) bodies born out of sexual reproduction (among plants and animals) and b) bodies born out of asexual reproduction (among plants and animals and also others). Here asexual reproduction is also being referred in addition to sexual reproduction.

अनियतदिग्देशपूर्वकत्वात् ॥ ६ ॥

अनियतदिग्देशपूर्वकत्वात् = due to the background being of random direction and location (of atoms).

Due to the background being of random direction and location (of atoms).

A sexual bodies are formed due to the random combinations of atoms in various unspecified (random) directions and locations. Aqueous bodies are formed by aqueous or \bar{A} pa atoms. Aerial bodies are formed by gaseous or $\bar{V}āy$ u atoms.

धर्मविशेषाच्च ॥ ७ ॥

च = also, **धर्मविशेषात्** = due to the specific or special dharma.

Also due to specific or special Dharma.

The behavior of the atoms is due to their specific dharma (or nature of behavior).

समाख्याभावाच्च ॥ ८ ॥

च = also, **समाख्याभावात्** = due to the existence of names and definitions.

Also due to the existence of names and definitions.

The existence of names and definitions is also the cause (for asexual bodies).

संज्ञाया आदित्वात् ॥ ९॥

संज्ञाया: आदित्वात् = due to the original state or primitiveness of the names.

Due to the original state or primitiveness of the names.

The asexual bodies have their original names.

सन्त्ययोनिजाः ॥ १० ॥

अयोनिजाः = asexually reproduced bodies, सन्ति = are in existence.

Asexually reproduced bodies are in existence.

Indeed the asexually reproduced bodies are in existence. The author is referring to well-known bodies which were asexually reproduced (during his time).

We have seen references to human beings born out of asexual reproductions. Some examples are Drona (born in a cup). There are human bodies. (But other bodies such as the body of Brahma are also born out of non sexual sources). Any other material body can also be born accordingly.

वेदलिङ्गात् ॥ ११ ॥

च = also, **वेदलिङ्गात्** = due to the indication by the Veda.

Also due to the indication by the Veda.

Also the references to the existence of asexually reproduced bodies are available in the Vedas.

Chapter - 5 : Part -I

MOTION

आत्मसंयोगप्रयत्नाभ्यां हस्ते कर्म ॥ १ ॥

कर्म = motion, हस्ते = in hand, आत्मसंयोगप्रयत्नाभ्याम् = due to the conjunction of the self and the effort.

Motion in hand (is produced) due to the conjunction of the self and the effort.

In this chapter motion is being discussed.

Motion in hand is possible due the conjunction of the self and the effort. (effort is a quality). When there is an effort in the self, it is reflected as motion in the hand, then the hand is moved. The effort has originated in the self, due to a desire of the self to move the hand. Unless there is an effort originating in the self, there cannot be any motion in the hand.

तथा हस्तसंयोगाच्च मुसले कर्म ॥ २ ॥

तथा च = in the same way also, हस्तसंयोगात् = due to the conjunction of the hand (with stone), कर्म = motion (is generated), मुसले = in stone (or pestle).

In the same way also, due to the conjunction of the hand (with stone) motion (is generated) in stone (or pestle).

Now a discussion is being presented where the hand is getting in contact with a stone (or pestle). When the hand is in motion and then during motion it gets in contact with a stone, then there is motion caused in the stone. Such a

motion in the stone is caused due to the impact and contact of the hand with the stone (as discussed in the next sūtra).

अभिधातजे मुसलादौ कर्मणि
व्यतिरेकादकारणं हस्तसंयोगः ॥ ३ ॥

अभिधातजे कर्मणि = in the motion born out of the impact, मुसलादौ = among stone and other objects, हस्तसंयोगः = conjunction of hand, अकारणम् = is not a cause, व्यतिरेकात् = due to the absence (of volition).

In the motion born out of the impact among the stone and the other objects conjunction of hand is not a cause due to the absence (of volition).

In the motion produced in the stone etc. by impact, conjunction with the hand alone cannot be the cause, due to the absence of volition (with in hand). Impact has to be there to cause motion in the stone (or pestle).

तथात्मसंयोगो हस्तकर्मणि ॥ ४ ॥

तथा = similarly, आत्मसंयोगः = the conjunction with the self (of effort), हस्तकर्मणि = in the motion in the hand.

Similarly the conjunction with the self (of effort) in the motion in the hand.

In the case of motion in the hand the conjunction with the self is not the cause, similarly.

अभिधातान्मुसलसंयोगाद्वस्ते कर्म ॥ ५ ॥

अभिधातात् = due to impact, मुसलसंयोगात् = caused due to the conjunction (of the hand) with the stone, कर्म = motion, हस्ते = in hand (is caused).

Due to the impact caused due to the conjunction (of the hand) with the stone, motion in hand (is caused).

In this sūtra the reaction on hand is being described.

Even though there is motion caused in the stone due to the impact of hand on the stone, it is being stated here that there is a motion caused in the hand also, due to its impact with the stone. This clearly is a reference to the reaction on hand (similar to recoil of a gun when fired).

For every action, there is an (equal and) opposite reaction - this is being stated in this sūtra.

The indication of the third law of motion of Newton can be inferred from this sūtra.

आत्मकर्म हस्तसंयोगाच्च ॥ ६ ॥

च = also, आत्मकर्म = self motion, हस्तसंयोगात् = due to the conjunction with the hand.

Also self motion due to the conjunction with the hand.

In similar lines of reaction, motion in the self (including the body) is also caused due to the conjunction with the hand. Just as motion in the stone has also caused motion in the hand as a reaction, motion in hand also causes motion in the self (in the body).

संयोगाभावे गुरुत्वात् पतनम् ॥ ७ ॥

पतनम् = fall (happens), गुरुत्वात् = due to Gurutwa (or heaviness), संयोगाभावे = in the absence of conjunction (with any other object).

Fall happens due to Gurutwa (or heaviness) in the absence of the conjunction (with any other object).

In this sūtra the role of Gurutva (or heaviness) is being described in causing the fall (पतनम्) of any object, if it is not in conjunction or contact with any other object.

It is being stated here that there shall be a fall of an object due to Gurutva, if such a fall is not prevented by any other object by its conjunction with the original object.

This sūtra indicates the knowledge of Gurutva and its effect on objects causing their fall (unless prevented by the contact with other objects).

In the next sūtra we can examine whether the Author knows that Gurutva was a force.

नोदनविशेषाभावात्रोर्ध्वं न तिर्यग्गमनम् ॥ ८ ॥

नोदनविशेषाभावात् = in the absence of a special force, गमनम् = motion (in general), न = is possible neither, ऊर्ध्वम् = upwards, न = nor, तिर्यक् = downwards.

In the absence of a special force the motion (in general) is possible neither upwards nor downwards. (Without a special force, motion (upwards or downwards) is not possible).

Having described the fall of the objects due to Gurutva (गुरुत्व) in the previous sūtra, the author is now stating that without the existence of a special force, neither upward motion nor downward motion (i.e. fall) is possible.

By stating so, the author is clearly implying that there has to be a special force existing to cause downward motion

or fall. Since he has referred to Gurutva (गुरुत्व) as the cause of the fall (पतनम्), in the absence of a contact to prevent it, we can safely conclude that he is identifying Gurutva (गुरुत्व) as a special force (by combining the meaning of both the present and previous sūtras).

In this sūtra the author was well aware of the need for a force for any kind of motion, downward or upward. In the previous sūtra he was well aware that all objects fall due to Gurutva (गुरुत्व) unless prevented. Even though Gurutva (गुरुत्व) was described as a quality originally, in this sūtra his knowledge of a force causing fall is evident.

Thus we conclude that the author was well aware of the existence and necessity of a force which causes Gurutva due to which objects fall down.

The author was also well aware of the role of a force in causing motion, speed and acceleration as indicated in the next two sūtras.

प्रयत्नविशेषात्रोदनविशेषः ॥ ९ ॥

नोदनविशेषः = special force, **प्रयत्नविशेषात्** = (is caused) due to the special effort.

Special force (is caused) due to the special effort.

A higher force can be caused by a higher effort.

नोदनविशेषादुदसनविशेषः ॥ १० ॥

उदसनविशेषः = special speed or velocity (extra velocity or acceleration), **नोदनविशेषात्** = due to special force (extra force or higher force).

Special speed or velocity (extra velocity or acceleration (is caused) due to special force (extra force or higher force).

In this sūtra the author is stating his knowledge of force and acceleration. Special force or greater force causes special speed or greater speed/velocity - acceleration. In other words acceleration is directly proportional to force.

Since greater force causes greater acceleration, it is directly proportional and can be expressed as follows:

f ∝ a. Force is directly proportional to acceleration.

Thus we see that the author was familiar with laws of motion. We have shown one law of motion in this sūtra and we have shown another (third) law of motion in the previous sūtras. The author was familiar with force and its necessity to cause acceleration or greater speed/ velocity, including downward motion or freefall due to gurutva. He was also aware of a force causing the fall. Since he was aware of acceleration caused by a force, in the context of a free fall we can conclude that he was aware of a force behind gurutva which causes acceleration during the free fall i.e. acceleration due to gurutva.

We can finally conclude that the Author was familiar with (a) Gurutva which causes freefall (unless prevented), (b) a force which causes a freefall (unless prevented), (c) acceleration caused due to a force. Summing up all the three we can state that acceleration due to a force causing freefall due to gurutva was known (the morphological similarity and the possible etymological link between the

word - *Gurutwa* in Sanskrit and the word - *Gravity* in English through its Greek origin cannot be ignored given the relationship of Greek with Sanskrit).

Broadly the Author was aware of the laws of motion. However, it is to be noted that this awareness as expressed here is qualitative. Quantitative treatment is not available here, there may be other texts where quantitative treatment could have been made available (we can see such texts at later periods).

In the next few sūtras the author is describing various types of motion - braking motion, explosive motion, vibratory motion, crystal vibrations, motion in a magnetic needle, ballistic motion, motion in liquids or viscous motion, capillary motion and also evaporation.

हस्तकर्मणा दारककर्म व्याख्यातम् ॥ ११ ॥

हस्तकर्मणा = along with the motion in hand, दारककर्म = braking motion, व्याख्यातम् = is described.

Along with the motion in hand braking motion is described.

In the context of the motion of the hand a force is not required, as effort of the self is utilized for producing the motion in hand. Braking motion (or a motion in hand of a child) is also possible by motion in hand.

VARIETY OF MOTIONS

EXPLOSIVE MOTION

तथा दग्धस्य विस्फोटने ॥ १२ ॥

तथा = similarly, विस्फोटने = explosion (explosive motion), दग्धस्य = of the burnt object.

Similarly explosion (explosive motion) of the burnt object.

Similarly an explosion can happen without a force causing it, due to the explosive nature of the ignited item (mixture). When an explosive is ignited, it will explode, displaying explosive motion.

SLEEP MOTION OR SLEEP WALKING

यत्नाभावे प्रसुप्तस्य चलनम् ॥ १३ ॥

प्रसुप्तस्य चलनम् = sleepwalking (of a person asleep), यत्नाभावे = without any effort or will.

Sleep walking (of a person asleep) without any effort or will.

Sleep walking of a person in sleep is possible without any effort (this is a medical abnormality).

VIBRATORY MOTION IN GRASS BLADES

तृणे कर्म वायुसंयोगात् ॥ १४ ॥

तृणे कर्म = (vibratory) motion in grass blades, वायुसंयोगात् = is due to conjunction with Vayu (air or breeze).

(Vibratory) motion in grass blades is due to conjunction with Vayu (air or breeze).

The vibratory motion in grass blade is due to their contact with Vāyu (air or breeze).

CRYSTAL MOTION AND MOTION OF THE MAGNETIC NEEDLE

मणिगमनं सूच्यभिसर्पणमित्यहष्टकारणकम् ॥ १५ ॥

मणिगमनम् = motion in crystals (quartz crystals, piezoelectric vibrations), सूची = (magnetic) needle, अभिसर्पणम् = deflection or vibratory motion, इति = these above, अहष्टकारणकम् = caused by an invisible force.

Motion in crystals, (magnetic) needle deflection or vibratory motion - these above caused by an invisible force.

The motion of a crystal (such as quartz crystal) and deflection or vibratory motion of a magnetic needle - these are all caused by a force which is invisible. Here the author is referring to the motions caused by the forces which are invisible. He recognized that there has to exist a force to cause these types of motions and since that force is invisible, he is stating the same as invisible (अदृष्ट).

This sūtra indicates the author's knowledge of invisible forces which have visible effects as vibrations. He may be aware of magnetic and electric forces which are also invisible.

In the next sūtra the author is describing ballistic motion of an arrow released from a bow.

इषावयुगपत्संयोगविशेषाः कर्मान्यत्वे हेतुः ॥ १६ ॥

इषौ = in the bow, अयुगपत् = gradually released (arrow), संयोग-विशेषाः = with special conjunction, हेतुः = the cause, कर्मान्यत्वे = of different motion.

In the bow gradually released (arrow) with special conjunction is the cause of different motion.

Now the description of an arrow being released from a bow is being presented. The release is gradual (not sudden) with special conjunction with the bow. The motion of the arrow will be different due to that slow release with special conjunction.

**नोदनादाद्यमिषोः कर्म तत्कर्मकारितात्र संस्कारादुत्तरं
तथोत्तरमुत्तरञ्च ॥ १७ ॥**

इषोः = of the arrow, आद्यं कर्म = the initial motion, नोदनात् = due to the force (of the bow on the arrow), च = and, तत् = that, कर्मकारितात् = having performed the motion, संस्कारात् = due to samskara (habit) of motion, उत्तरं कर्म = further motion, तथोत्तरमुत्तरञ्जः = and further motion and so on.

Of the arrow, the initial motion due to the force (of the bow on the arrow) and that having performed, the motion due to samskāra (habit) of motion, further motion and further motion and so on.

In this sūtra the motion of a released arrow from a bow is being described. The initial motion of the arrow is due to the force of the bow on the arrow. That initial motion, when performed, causes Sam-skāra (संस्कार) of motion. We can interpret this as a tendency or trend or habit of motion. This results in further motion and further motion and so on. In modern times we call this 'Kinetic Energy'.

संस्काराभावे गुरुत्वात् पतनम् ॥ १८ ॥

पतनम् = free fall, गुरुत्वात् = due to Gurutva (happens), संस्काराभावे = in the absence of the trait or tendency (of motion).

Free fall due to gurutva (happens) in the absence of the trait or tendency (of motion).

Upon the cessation of Sam-skāra or trait or tendency of motion, the arrow shall suffer a free fall due to gurutva.

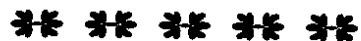
We can interpret Sam-skāra of motion as equivalent to kinetic energy.

During the next motion of the arrow (due to kinetic energy generated due to the motion starting with the initial

motion) and continuing until the kinetic energy is exhausted, in which case the arrow will suffer a free fall.

In this sūtra the author is describing ballistic motion of an arrow released from a bow. It starts with the energy provided by the release and executes motion, due to which it generates Samskāra, until it is exhausted. When no more Samskāra is left out with the arrow, it shall suffer a free fall, due to gurutva. We may infer the similarity of Samskāra in motion with kinetic energy of modern times.

In this sūtra the author's knowledge of ballistic motion is brought out clearly, albeit qualitatively, including the understanding of kinetic energy and gravitation. Quantitative treatment is found in other texts.



Chapter - 5 : Part -II

MOTION IN SOLIDS

नोदनाभिधातात् संयुक्तसंयोगाच्च पृथिव्यां कर्म ॥ १।।

कर्म = motion (will happen), पृथिव्याम् = in Prithivi (solids),
नोदनाभिधातात् = due to the impact of a force, च = and also, संयुक्त-
संयोगात् = due to the conjunction of the combination (mixture).

Motion (will happen) in Prithivi (solids) due to the impact of a force and also due to the conjunction of the combination (mixture).

Motion in solids can happen due to (a) impact of a force and (b) combination (mixture such as gun powder or any explosive mixture).

As seen previously, the motion will take place whenever there is an impact on a solid body by a force. Alternatively, motion as in explosion will take place due to the combination (mixture) of certain (explosive) materials.

तद्विशेषेणादृष्टकारितम् ॥ २।।

तद्विशेषेण = the various varieties of motion, अदृष्टकारितम् = are caused by unseen or invisible (forces).

The various (other) varieties of motion are caused by unseen or invisible (forces)

Various other forms of motion such as earthquake etc., are all caused by the unseen or invisible forces. Other forms include motion of magnetic needle or crystal, etc., as described previously.

The author has classified all causes of motion as (a) seen or visible (forces); (b) unseen or invisible (forces). As discussed previously the seen or visible causes or forces are related to impact (of hand on a stone). The invisible forces do not have any visible cause we can include a good number of forces such as magnetic, electrostatic and other forces also under this category.

LIQUID STATE PROPERTIES

अपां संयोगाभावे गुरुत्वात् पतनम्॥ ३॥

अपाम् = among Apa or liquids, **पतनम्** = fall (free fall) takes place, **गुरुत्वात्** = due to Gurutva, **संयोगाभावे** = in the absence of any kind of contact or conjunction with any other object.

Among Apa or liquids, fall (free fall) takes place due to Gurutva in the absence of any kind of contact or conjunction with any other object.

As in the case of the solids (discussed previously), free fall due to gravity will take place among liquids also, unless there is an object which shall prevent such a fall due to its contact or conjunction with the liquid under fall.

In this sūtra and in the next few sūtras properties of the liquid state are being discussed.

द्रवत्वात् स्यन्दनम्॥ ४॥

द्रवत्वात् = due to liquidity, **स्यन्दनम्** = viscous flow will take place (among liquids).

Due to liquidity, viscous flow will take place (among liquids).

The viscous flow of liquids is due to their liquidity.

Here the author is showing his familiarity with liquid state properties such as slow or viscous flow of liquids due to their liquidity (which may be varying from liquid to liquid).

EVAPORATION

नाड्यो वायुसंयोगादारोहणम् ॥ ५ ॥

आरोहणम् = evaporation (takes place), due to (the exposure to) sunlight (नाडी - Sun ray), नाड्यः = Sun ray, वायुसंयोगात् = due to contact with Vayu (breeze, air, gas).

Evaporation (takes place) due to (exposure to) sunlight and due to contact with Vayu (breeze, air, gas).

Evaporation takes place (in liquids) due to either exposure to sunlight or due to contact with Vayu (air, breeze, gas).

It is clear that the author is familiar with the principles of evaporation and its causes.

नोदनापीडनात् संयुक्तसंयोगात् ॥ ६ ॥

च = and also (evaporation takes place), (अपीडनात् = due to removal or absence of pressure,) नोदनापीडनात् = due to force or due to (removal or) absence of pressure, च संयुक्तसंयोगात् = also due to conjunction or contact with a mixture.

And also (evaporation takes place) due to the (removal or) absence of pressure, due to a force and also due to the conjunction or contact with a mixture.

In addition to exposure to sunlight and contact with Vāyu, the phenomenon of evaporation can take place due to lessening or removing (or absence) of pressure (eg. atmos-

pheric pressure), or due to the application of a force or due to a mixture of (explosive) materials.

In this sūtra we can clearly see the hints of Boyle's Law (i.e. $PV = \text{constant}$).

Evaporation can take place due to a variety of causes: a) exposure to sunlight: b) contact with Vāyu (air, breeze, gas); c) by reduction or removal of pressure; d) by application of a force and e) due to chemical combination or mixture. The author seems to be familiar with change of state also.

वृक्षाभिसर्पणमित्यहस्तकारितम् ॥ ७ ॥

वृक्षाभिसर्पणम् = the creeping motion of liquids inside the tree trunk, इति = this is, अहस्तकारितम् = caused by an unseen or invisible force.

The creeping motion of liquids inside the tree trunk, this is caused by an unseen or invisible force.

Here the author is describing capillary motion or osmosis (upward motion of liquids in tree trunks against gravity).

In the above sūtras we can clearly see the familiarity of author with various kinds of motions in liquid state properties.

CONDENSATION OR DECOMPOSITION

अपां सङ्ग्रातो विलयनश्च तेजस्संयोगात् ॥ ८ ॥

अपाम् = among Apa (or liquids), सङ्ग्रातः = coming together, condensation or synthesis, च विलयनम् = and also dissolution or

decomposition (is caused), तेजस्संयोगात् = due to the conjunction or contact with Teja (energy).

Among Apa (or liquids) coming together, condensation or synthesis and also dissolution or decomposition (is caused) due to the conjunction or contact with Teja (energy).

This is a very profound sūtra where the role of Energy principle i.e. Teja or Agni is being presented to be the cause of the synthesis or condensation or formation of liquids as water and also their decomposition or dissolution. In modern times we are aware of the fact that water gets formed due to the condensation of water vapor which gets created by the conjunction or synthesis between hydrogen and oxygen. The converse i.e. decomposition of water can also take place. In both the cases the cause is electrical energy, which is a form of Energy Principle, Teja or Agni. In the next sūtra the author is elaborating the same.

ELECTRIC DISCHARGE

तत्र विस्फूर्जथुलिङ्गम् ॥ ९१ ॥

तत्र = there in, लिङ्गम् = the proof or indicative characteristic (for the previous Sutra) is, विस्फूर्जथुः = the lightning or thunder (in the clouds).

There in the proof or indicative characteristic (for the previous Sutra) is the lightning or thunder (in the clouds).

The formation of water in the clouds due to thunder with electrical discharge is being discussed here. This shows the familiarity of the author with electrical energy and

the cause of formation of water vapour and its condensation into water.

(Benjamin Franklin is usually credited with the discovery of electricity. Here we find that the author is familiar with the electricity, several thousand years before Benjamin Franklin).

वैदिकञ्च ॥ १० ॥

च = and also, वैदिकम् = (it is) from the Veda.

And also (it is) from the Veda.

The author is referring to the Veda as a source of the proof or indicative characteristic of electrical discharge being the cause of formation of water.

Referring to the Veda, we have many hymns in the praise of Agni or the Universal Energy principle:

गर्भोऽस्योषधीनां गर्भो वनस्पतीनां गर्भो विश्वस्य भूतस्य अग्ने! गर्भो अपामसि।

'Oh Agni, you are present as the womb of plants, trees, the Elements, the Universe and the liquids.'

In this Mantra from the Veda the Universal Energy Principle - Agni is being described to be present in all plants, trees, the Elements and the Universe in addition to the liquids. The synthesis and decomposition of liquids as water takes place due to Agni, the Energy Principle. Energy principle is described as the womb of everything in the Universe.

अपां संयोगाद्विभागाच्च स्तनयित्नोः ॥ ११ ॥

अपाम् = of liquids, संयोगाद्विभागाच्च = due to the conjunction or synthesis and disjunction or decomposition, स्तनयित्नोः = due to thunder (or electric discharge) in the clouds.

Of liquids, the conjunction or synthesis and disjunction or decomposition takes place due to the thunder (or electric discharge) in the clouds.

The author is reiterating the process of formation of water, due to electric discharge in the clouds.

पृथिवीकर्मणा तेजःकर्म वायुकर्म च व्याख्यातम् ॥ १२ ॥

तेजःकर्म = the upward burning of flame of Fire, वायुकर्म = the downward motion of Vayu, पृथिवीकर्मणा च = the primordial or the original vibratory motions of the atoms are, व्याख्यातम् = caused by an unseen or invisible force.

The upward burning of flame of Fire, the downward motion of Vayu, the primordial or the original vibratory motions of the atoms are all caused by an unseen or invisible force.

In this sūtra the author is displaying his familiarity with the original vibratory motions of the atoms and ascribing their cause to some invisible forces.

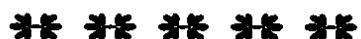
We see that the author is familiar with the atoms and their original (premordial) state of vibration or motion. Atoms are known to be vibrating.

In this chapter we have seen the familiarity of Kanāda, the author of the Vaiśeṣikasūtras with various forms and types of motion, various forces (visible and invisible) and

various forms of energy all of which have been utilized to explain various physical phenomena in all the three states of matter.

CONCLUSION

In the above five chapters we could clearly see the modelling of the physical world according to Kanāda. The basic fundamental substances or entities (Padārthas), the substances or material entities (dravyas), their qualities (guṇas) and their motions of different types were all explained with fascinating detailed, several thousand years before the advent of Modern Science and Classical Physics.



Appendix

Abstract of Chapters 6,7,8,9 and 10 of Vaiśeṣikasūtras.

The subject matter dealt in Chapter 6 to Chapter 10 is summarised below:

Chapter - 6

Part - I of Chapter 6 of Vaiśeṣikasūtra deals with the issues concerning the content of the Veda and of Brāhmaṇa texts, results of good and bad deeds, different recipients of charity, duties of Brahmins under critical situations, etc.

Part - II of Chapter 6 deals with meritorious deeds to be performed for spiritual benefit and for future benefits; the duties of the four castes, determination of purity and impurity; consumption of specific types of foods and mental restraint; desire, hankering, craze and their causes; effects of desires and aversions.

Chapter - 7

Part - I of Chapter 7 deals with the subjects relating to qualities or properties (*guṇas*), nature of form/shape/colour, taste, smell, touch in Pr̥thivī, in Āpa, in Teja and in Vāyu. The origin of qualities in the Dravyas is discussed. The Nature of various gunas or qualities in each of the Dravyas is discussed. The qualities of Pr̥thivī are not eternal while those in Āpa, Vāyu and Agni are eternal.

The discussion on "Dimension" also provides interesting descriptions of "atomic" (*Anu*) dimensions and huge (*Mahat*) dimensions.

Ākāśa (ether) and Ātman (self) are both described as infinitely large in size. Though individual forms of Ākāśa and Ātma or Self may be small or limited, in totality the dimensions of Ākāśa and Ātman are infinite in their dimensions. But Manas or mind is not admitted to be infinite, as it does not have such infinite property. Manas or Mind is internal organ and has limited dimension. Space or Dik is admitted to have infinite dimension. Time is admitted to be ubiquitous and infinite, as it is based upon Cause and Effect relationship of events. Since this chain of Cause and Effect relationships is always there, time also can be considered to have infinite dimensions. Thus, this section deals with very important aspects of qualities of Dravyas.

In Part - II of Chapter 7, the discussion is provided on Number, Priority, Posteriority, Conjunction, Disjunction, etc.

Number One or Unity and Separateness are identified as distinct and separate entities due to being different from form/shape/colour, taste, smell, touch, etc. It is meant here that the perception of "Oneness" or "Separateness" is cognised by humans as being independent and different from various other commonly known qualities such as form/shape/colour (rūpa), taste (rasa), smell (gandha).

One "oneness" cannot contain another "oneness".
One - separateness" cannot contain another "separateness"

One "smallness" (atomicity) cannot contain another "smallness" (atomicity) (by definition) and "largeness" (hugeness) cannot contain another "largeness" (hugeness).

Similarly motion (Karma) is by itself, it cannot be containing another "motion". Similarly quality (Guṇa) is by itself, it cannot be containing another "quality".

Note: Here atomic actions and atomic qualities are being referred - by definition they are indivisible. Motion (Karma) and Quality (Guṇa) being qualitative (not to be counted as one, etc.) Their abstract and qualitative nature is being stated.

If primary Oneness or Unity does not exist, its divisions also do not exist.

For Cause and Effect also, Oneness or Separateness cannot exist. Such interpretation or understanding is for eternals only (for non eternal unity and non eternal separateness).

CONJUNCTION OR DISJUNCTION

What is Conjunction (Samyoga)? This is defined as:

Conjunction is produced by the Motion (or action) of either of the two entities involved or by the motion (or action) of both or by the conjunction of motion (or action) by both.

Similarly, disjunction is produced in three ways - either of the two entities getting separated or being separated.

Further decomposition of Conjunction or Disjunction is not possible in terms of their own conjunction or disjunction (as they are atomic in nature). One conjunction and one disjunction cannot be sub-divided further into conjunction and another disjunction.

Sound :

Detailed discussion of Sound is given.

Chapter - 8

What is perception?

Perception is the ability to know or to have knowledge of the Dravyas, i.e., Substances. The Mind and Self are both essential agencies of such perception.

Substance alone causes perception.

Substance (Dravya) alone makes perception happen - qualities (Guṇa) and motion (Karma) (or action) alone cannot make perceptions happen. A substance (Dravya) is essential so as to be brought in contact with sense organs. Again the conceptual structures such as generalization and particularization (or specialization) cannot by themselves (without Dravya) produce perception - it is only the substance (Dravya) which produces perception.

But perception is influenced by qualities and motion as they create particular details of perception of the substance in the mind (e.g., whiteness is a quality and whiteness of a substance cloth causes perception of white cloth).

Sense Organs

Sense Organs are related to their corresponding Dravyas. In fact Dravyas cause the specific functions of Sense Organs. (This is to be noted as significant departure from Sāṅkhyas, position of accepting only five sense organs and five "Tanmātras" - here the substances (Dravyas) are given greater importance and are recognized to have inde-

pendent existence and also be the causes of functions of respective sense organs.

Chapter - 9

This chapter deals with the nature of inference and also yogic (occult) perception.

An effect can be perceived only if it is caused or produced by its cause (as it cannot be perceived before its productibn). An effect cannot be perceived after it is destroyed. Thus, an effect cannot be perceived before its production and cannot be perceived after its destruction. An object is present before its destruction and after its production. Therefore, it is not non existent.

The knowledge that a thing is non existent results from the non existence of a past perception, rememberance of past and also from the perception of a contradictory or a distinct (another) object (e.g., Cow is different from Horse).

Like wise the knowledge in prior non existence results from the perception of existence. A pot is made of mud. Mud is perceived first - then, when it is made into a pot, then a pot is perceived - not mud. When the pot is used for cooking rice, then a cooking vessel is perceived and not pot (or mud).

Even though it is perceived as a cooking vessel, a pot is remembered (and mud also). Apart from such prior non existence, posterior non existence and mutual non existence, there is also what is known as "absolute non existence, e.g., hare's horn or water in mirage, etc.,

Existence and non existence cannot exist simultaneously as they are mutually contradictory. An effect is always non existent in its cause. It cannot simultaneously be existent and non existent (because they two are mutually contradictory).

Yogic or Occult Perception

Sūtra - आत्मनि आत्ममनसोः संयोगविशेषात् आत्मप्रत्यक्षम् ।

The Self can be perceived with in one's self by a special conjunction of mind and self (yogic state or Meditation or Samādhi, broadly).

Such perception is also possible for substances (Dravyas), yogic or occult perception is possible on substances (Mr. Leadbeater of Theosophical Society, 19th century could perceive atomic agglomerations of different chemical substances).

Yogis can have perception also due to conjunction of self, mind, senses and their objects. Such extraordinary occult or yogic perception is not possible for common people. Such perception can also be about inherent qualities of substances which common people cannot perceive. Similarly, the inherent qualities of self can be perceived.

INFERENCE

There can be four types of relationships: Cause (Karana), Effect (Kārya), Relationship (Sambandha or where one is conjoined with another such as relationship between smoke and fire), unique inherence (Ekārthaśamavāyi) as "hand is inhered in one with leg") and Contradiction (of four types referred elsewhere).

Chapter - 10

Pleasure and Pain

The inherence of pleasure and pain is described to be independent of five elements (substances) and also independent from the qualities of the five elements. Causes of each are different and independent. Mutually they are opposed to each other.

Doubt and ascertainment or Decision.

Doubt (Samśaya) and **Decision (Nirṇaya)** are caused by independent objects. Knowledge of Cause and Effect.

The production of knowledge of Cause and Effect is based on perception (Pratyakṣa) and inference (Anumāna). The knowledge that the Effect is produced from the Cause arises out of knowledge that "effect is to be produced", "Effect being produced" and "Effect is already produced". The knowledge "the Effect was produced" arises in one part due to perception of the parts present with other causes co-inherent in the same object.

The knowledge of "Cause" arises from the inherence of its Effects. It is also due to inherence of action in the Cause.

CONCLUSION

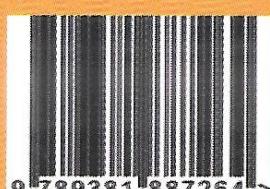
In the Chapters 6,7,8,9 and 10 Kanāda discusses fundamental issues relating to perception, cause, effect, inherence of qualities, nature of qualities, nature of Self, Ākāśa (as one and infinite) and other related matters on the subjects already discussed in Chapters 1,2,3,4 and 5.



About the Book

The origin of basic Classical Physics is usually attributed to the West from about 16th or 17th Century A.D. However, the great monuments all over the World (e.g., Pyramids of Egypt or Temples of India) provide the evidence which demonstrates the knowledge of significant engineering skills for atleast several centuries before the 16th Century, if not even earlier. Without the knowledge of basic classical physics it is not possible to execute such engineering feats.

What was the basic framework of classical physics of ancient Indian origin? The earliest reference to the principles of Physics is found in Vaisesika Darshana, one of the six schools of India philosophy known as the Six Darshanas. The Vaisesika Sutras of Kanada are the earliest known source of discussion and analysis on the basic principles of classical physics. In this book an attempt is made to bring out the clear exposition of ancient classical physics, in terms of the three states of matter and various forms of energy with the qualitative description of their properties. The description of various laws of physics, as various types of laws of motion, gravitation, electricity, magnetism and other forces are all available in Vaisesika. The atomic theory of Kanada is his highest contribution to ancient physics.



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