

CHAPTER

7

Knowledge: Framework and Classification

LEARNING OUTCOMES



After finishing this chapter, you will be able to:

- ▶ Understand the framework for establishing the right knowledge
- ▶ Appreciate the Vaiśeṣikan approach to describe the physical reality through various components and classifications
- ▶ Get introduced to the Nyāya framework
- ▶ Familiarise with Nyāya approach for resolving ambiguity through logic and argumentation

The major contribution of the Nyāya-śāstra is its profound approach to establishing valid knowledge. Using 528 sūtras, Nyāya discusses various aspects related to rules of reason, logic, epistemology and metaphysics. As per some Tibetan records Buddhist scholars spent years with Nyāya scholars to master the art of reasoning and logic. The picture shows the first ten sūtras from Nyāya-śāstra.

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We have made tremendous progress in the last 150 years with technological advances, scientific discoveries, and new inventions. There is a widespread feeling that we have developed capabilities to find new knowledge in hitherto unknown domains, however, this is not a new-found capability for the human race. Human beings armed with the thinking faculty have constantly strived to make innovations. Making such innovations follow a structured process, which culminates in resolving ambiguities in our understanding and finding new knowledge. The entire process requires that we have a robust framework to establish new knowledge. This has been the constant preoccupation of human beings. Ancient Indians too have developed a methodology for establishing new knowledge.

There is a feeling that the Indian thought process is driven by blind beliefs and dogmas rooted in a religious context. It is generally believed that much of the ideas developed and propagated down the ages have been on faith and were left unquestioned. If we explore the culture of developing new knowledge systems in India, we discover something on the contrary. A case in point is the development of Darśanas (Philosophical schools of thought) in India (in Chapter 3 we have introduced Darśanas and discussed some of the unique aspects). There are multiple schools of thought and there has been a healthy tradition of arguing and counter-objective manner. In fact, one of the Darśanas, known as Nyāya, has specifically focused on how one can systematically inquire into a problem and establish new knowledge in a structured process. Using the tools and techniques developed by Nyāya researchers over 1000 years, a sound framework for logic and epistemology has been developed which has come in handy to critically analyse established tenets and bring in new knowledge. We shall see some aspects of these in this chapter.

7.1 THE KNOWLEDGE TRIANGLE

Knowledge (Jñāna) is defined as apprehension or consciousness. All knowledge is a revelation or manifestation of objects, just as a lamp manifests physical things placed before it. Knowledge may be valid or invalid. Valid knowledge (Pramā) is defined as the right apprehension of an object or knowing an object as it is. A valid knowledge corresponds to the reality and not anything other than that and is indeed produced by some valid means. Invalid knowledge includes memory, doubt, error, and hypothetical reasoning. Memory is not valid because the object remembered is not directly presented to the ātman, but only indirectly recalled. Doubt is uncertainty in cognition. Error is misapprehension as it does not correspond to the real object. Hypothetical reasoning is no real knowledge. When we see a rope as a snake, we have obtained the right knowledge. If we are uncertain whether it is a rope or a snake, we have doubt. We may need some means by which the doubt is unambiguously resolved. If we merely recall the rope that we have seen, it is memory. If we mistake the rope for a snake, we are erroneous.

Valid knowledge is that which has been established rigorously and systematically so that it is non-refutable, true, and reliable in the context and the conditions in which the knowledge is supposed to be applicable. Typically, in the Indian tradition, the aspects of valid knowledge could be best understood from the notion of a knowledge triangle. Figure 7.1 pictorially represents the knowledge triangle, which consists of three components and provides the overall context for obtaining the right knowledge.

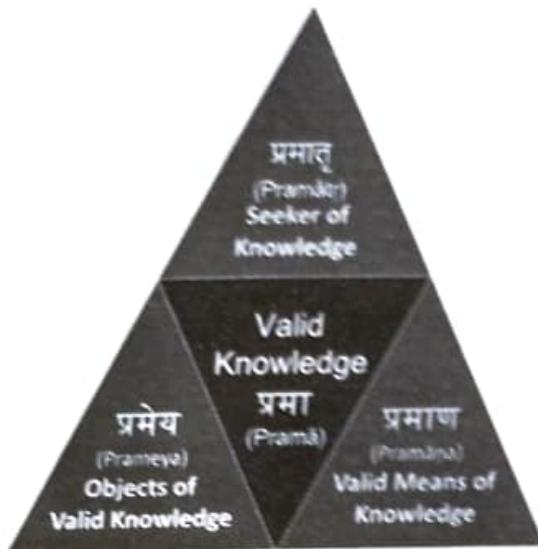


FIGURE 7.1 The Knowledge Triangle

- ◆ Firstly, the knowledge is obtained ultimately only by a seeker of the knowledge. Viewed in this manner all forms of knowledge manifest eventually as 'implicit' knowledge in the mind of the knowledge seeker. Whether it is a Nobel Laureate in Physics or a Scientist working in a laboratory developing a new formulation for medicine, or a spiritual seeker wanting to know who he/she is, the knowledge accrues in him/her only. Therefore, the first component of the knowledge triangle is the seeker of knowledge. The seeker of the knowledge is referred to as **Pramātri**. The knowledge seeker gets mentally involved in the process and commits physical and other resources and time to the process. Once the knowledge seeker obtain the implicit knowledge he/she may choose to make it available to the others by way of tacit knowledge.
- ◆ The efforts of the knowledge seeker are directed towards some object or entity, as it becomes the context for seeking knowledge. This is the second aspect of knowledge known as **Prameya**. For instance, a scientist developing a new vaccine will direct his/her entire focus in the knowledge creation process on the virus and all the aspects related to it. A physicist wanting to understand the world as a physical entity will direct the attention toward various aspects of the physical reality. The basic elements that constitute the physical reality, the processes that they employ to combine and regenerate into multiple forms and shapes may become the objects of knowledge that are being sought by the researcher. The term object does not have a mere 'physical' orientation. It includes all that towards which effort is directed to obtain the knowledge which may include physical, meta-physical, virtual, and other entities.
- ◆ New knowledge creation is invariably a process of starting from known ideas and forms and progressing into the domain of the unknown. In this journey, since the destination is somewhat unknown, we need valid means to assure ourselves that the journey indeed was fruitful, and the process was robust and flawless. Therefore, the third component is to have valid means of obtaining the knowledge. In the Indian tradition, this is known as **Pramāṇa**.

Two schools of Indian thought, Nyāya, and Vaiśeṣika address the issue of knowledge of the reality, i.e. of the physical world of several entities and their interactions. Vaiśeṣika mainly confines itself to 'the exposition of reality' and Nyāya focuses on the issue of 'right knowledge'

of reality'. To put it in another way, Vaiśeṣika deals with metaphysics and ontology, and Nyāya deals with logic and epistemology. The key contribution of Nyāya-śāstra lies in providing a robust framework for establishing the right knowledge. The very first sūtra in the text begins with identifying sixteen factors that one needs to take into consideration while establishing the right knowledge. A correct understanding of these and appropriate use of them is critical in the process¹. These sixteen factors provide a comprehensive set of concepts that help one to establish knowledge using a structured approach.

The principles laid out in Nyāya are fundamental and have had the widest appeal as a general framework for creating new knowledge and advancing our thoughts through logic and argumentation. The Nyāya principles have become a very useful tool for experts in all other fields (literature, grammar, philosophical studies, and other fields of knowledge). There have been numerous attempts both in India and outside to write commentaries on Nyāya.

Relating to our knowledge triangle; Vaiśeṣika deals with prameya of the knowledge triangle, whereas Nyāya mainly deals with pramāṇas, valid means of knowledge. However, in Nyāya-śāstra at a generalised level of abstraction 12 objects of knowledge (prameya) have been identified². In this chapter, we shall use the Vaiśeṣika framework to understand the physical reality that presents itself as the object for knowledge creation. On the other hand, we shall use the Nyāya framework to understand various aspects of establishing valid knowledge.

7.2 PRAMEYA – A VAIŚEṢIKAN APPROACH TO PHYSICAL REALITY

Physics is one of the foundational aspects of Science and Technology, like Mathematics. It is a study of the 'reality' as we know and is concerned with space, time, matter, and energy. It provides a set of ideas, concepts, and theoretical backgrounds weaved into relevant frameworks so that we can make sense of things around us and understand the myriad combination of things that exist in the Universe and their inter-relationships. In the Indian tradition, these issues have been addressed in varying levels of abstraction in different works including some of the darśanas. In the course of this inquiry, it became necessary to understand the Universe in terms of its origin, its multi-dimensional nature, the constituents and their properties, and their inter-relationships. These topics form part of the modern-day branch of scientific study known as 'physics'. While modern science has provided much greater depth and detail into specific aspects of the physical reality, Vaiśeṣika has provided an overall framework and a higher level of abstraction of the physical reality. Vaiśeṣika is an effort to describe all the 'nameable and knowable' entities. The term Vaiśeṣika is derived from the term 'Viśeṣa', meaning an individual or special characteristic. The categorisation of the Universe is attempted using individual or atomic elementals and their association with one another, hence the term 'Vaiśeṣika'. This was propounded by Kaṇāda, a sage who is variously estimated to have lived between the 6th-2nd century BCE.

Kaṇāda composed about 370 sūtras (short aphorisms) using which he described the physical reality using a classification framework. Vaiśeṣika-darśana categorises substances that form the physical world, their attributes, and interactions. The system formally included space, time and matter, and other factors to establish the basic premises that govern the physical entities. The text establishes certain fundamental properties of physical entities linking them to basic atoms and paves the way for using these ideas in applied sciences such as Āyurveda and Śilpa-śāstra.

In the Indian tradition, the origin and dissolution of the Universe and its relation to God are assumed to be a two-stage process: primary or original and secondary or derivative. The primary stage of the evolution process is assumed to result in creating ether, time, space, and the ultimate atoms or elementals (Earth, Water, Fire, and Air). In the second stage, the focus is on how the multitude of physical entities are created once the Universe manifests through the primary stage of evolution. Kanāda's approach in Vaiśeṣika is directed towards the second stage of the creation. While Kanāda believed that an infinite intelligence created the Universe, he adopted a three-pronged approach in Vaiśeṣika to study the physical properties of the created Universe:

- ◆ Vaiśeṣikā is an effort to present a systematic framework to describe all the 'nameable and knowable' entities.
- ◆ Vaiśeṣikā establishes fundamental properties of physical entities linking them to basic atoms and paves the way for using these ideas in applied sciences such as Āyurveda and Śilpa śāstra.

◆ Parīksā – Examine using perception and inference to establish the knowledge
 ◆ Uddeśa – A classification framework to enumerate 'knowable and nameable,' things of the physical reality
 ◆ Lakṣaṇa – Definitions to establish certain properties

Vaiśeṣika proposed a framework to categorise and explain the entire gamut of the physical reality (predicable). Figure 7.2 illustrates the framework in simple terms. Predicable could be either existence or non-existence. Six sub-categories constitute existence and knowledge of them is considered the essence of the supreme good³. The first three, Dravya – substance, Guṇa – attributes, and Karma – action are objective aspects. The other three categories include Sāmānya – Universality, Viśeṣa – Specialty, and Samavāya – inherence or combination. These three are outcomes of intellectual discrimination.

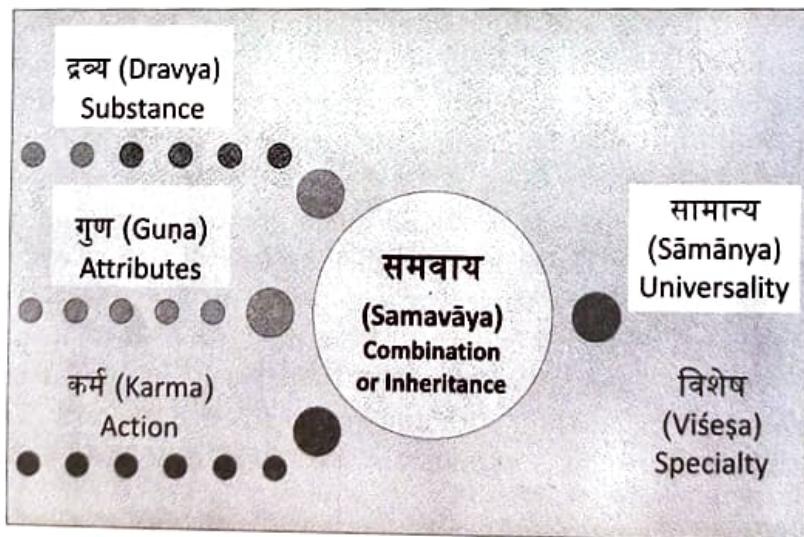


FIGURE 7.2 The Vaiśeṣika Framework

Physical reality invariably could be classified under 'Universality' (or Genus) and 'Specialty'(or Species). Universality is the principle of assimilation that presents the substratum of the observed substances, i.e. it presents the generic properties. On the other hand, 'Specialty' is the principle of differentiation within observed classes and patterns of existence. Vaiśeṣika presents certain principles pertaining to Universality and Specialty that characterise physical

reality⁴. Substances (Dravya), attributes (Guna), and action (Karma) have both generalisation and specialisation. This enables us to make sense of the physical reality in terms of class – sub-class hierarchical structure. A combination is not a simple idea such as conjunction or addition of different aspects into one. It is a property, by which one develops the intuition, 'this is here'with respect to effect and cause. It is the relation of things and their attributes, inseparably associated by nature. Therefore, it indicates the property of inheritance.

Using this classification framework, Kanāda explained the physical reality from the concrete to abstract that forms part of the Universe. In the six-part classification, the first three (substance, attributes, and action) are objective and concrete. The other three belong to the domain of intellectual determination. This implies the role of the mind and the thinking faculty of the observer through a certain process of assimilation. Therefore the 'observer' is also part of the 'observed' in the final analysis and sense-making. The Vaiśeṣika-sūtras are organised under ten chapters, with two sections in each chapter. The first chapter presents the proposed classification framework and enumerates the components that form the classification. The second chapter describes the nine substances. The subsequent chapters deal with other topics related to the framework.

7.2.1 Dravyas – The Constituents of the Physical Reality

Dravya constitutes the basic building block of the physical reality. It is difficult to translate 'dravya' exactly into English, the possible words are realities, entities, or substances. For the sake of equivalence and familiarity let us use the word 'substance'. Substance, as we know is nothing but matter with certain characteristics. The notion of 'substance' in Vaiśeṣika is much broader than the modern-day definition. In Vaiśeṣika, non-corporal or imponderables such as time, space, ātman, and mind are also included. We need to be aware of these aspects when we use the word 'substance' in place of dravya. All the translated terms in the chapter have a similar limitation. These translated terms should not be confused with the modern-day perspectives of Science. For example, in Vaiśeṣika, Earth, Water, and Air are fundamental and homogenous kind of matter characterised by its own specific quality or attribute. On the other hand, for a modern scientist, these are compounds (or mixtures) each of which could be reduced to its parts.

There are certain fundamental characteristics of a substance as per Vaiśeṣika. Substances possess karma (action) and guṇa (attributes) in them⁵ and are fundamentally a combinative cause. In other words, the basic atomic nature of the category of the substance allows the creating of many different things using the principle of Samavāya⁶. In this progressive process of samavāya, the entire physical reality could be visualised. One can see this at several levels of abstraction. For example, the threads of different colours can combine to form a beautiful fabric. Viewed in this fashion, the substances are the combinative causes as well as the effects of the causes. Further, they provide the Universality and the Specialty.

There are nine types of substances identified in Vaiśeṣika. These include Pṛthivī – Earth, Ap – Water, Tejas – Fire, Vāyu – Air, Ākāśa – Ether, Dik – Space, Kāla – Time, Ātmā – Ātman (or Self), and Manas – Mind⁷. Figure 7.3 has details of these and their sub-classifications. There are five physical substances (Earth, Water, Fire, Air,

- ◆ In the six-part classification proposed by Kanāda, the first three (substance, attributes, and action) are objective and concrete.
- ◆ The basic building blocks of the physical reality are the Dravya in the framework of Vaiśeṣika.

and Ether). Each of them has some specific quality perceptible to an external sense. Of the five physical substances, ākāśa differs from the other four. Ākāśa is a non-corporeal substance of unlimited magnitude. The other four physical substances are capable of producing composite substances out of themselves, which is not the case in Ākāśa.

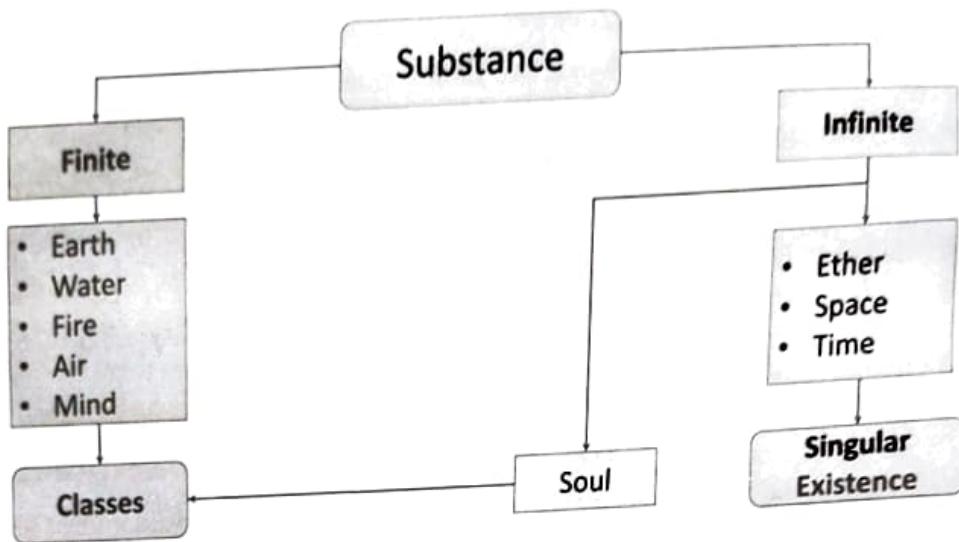


FIGURE 7.3 Nine Categories of Substances

Substances can be finite or infinite. Ether, Space, Time, and Ātman are considered infinite. On the other hand, Earth, Water, Fire, Air, and Mind are considered finite. Another useful dimension is whether the substances or unitary are of different classes. As indicated in Figure 7.3, Ether, Space, and Time are considered unitary and eternal. Since Vaiśeṣika has taken an atomic approach to understand and describe the physical reality, it is useful to know this dimension of the substances also. The eternal and unitary substances viz., ether, space, and time are the non-atomic substratum. On the other hand, the elementals earth, water, fire, and air are composed of atomic substances. According to Vaiśeṣika, two basic atoms (*aṇus*) can combine to become *dvyāṇuka* (dyads), and three such dyads are the constituent of a *tryaṇuka* (triad), which is the smallest form of a gross body visible to the naked eye. The notion of 'atom' (*Aṇu*) as referred to in Vaiśeṣika should not be confused with the current-day understanding of 'atom'. An *Aṇu* in Vaiśeṣika is merely the 'minima' and changeless entity. They are considered absolutely without any magnitude nor do they have a spatial dimension. On the other hand, in modern conception atoms have definite magnitude.

It is important to know that the notion of Ether (Ākāśa) is different from space as presented in Vaiśeṣika. Ākāśa is the typical ether in which all the substances exist. Moreover, it is the medium for the sound to travel. On the other hand, space is merely a dimension providing direction. Its role is to provide a spatial and locational reference for the entities that exist in physical reality. Mere space does not guarantee the propagation of sound particles.

The status of 'self' and 'mind' also needs to be clearly understood. Self is pure awareness and provides the capability to observe. Therefore, it serves the role of the 'observer' of physical reality and events in the Universe. However, to make use of this capability, a mechanism to observe and process the information obtained out of the observation is required. This is the role of the 'mind'. When one is in deep sleep, the 'self' exists but the mind is switched off. Therefore, no observations of the physical reality could be made during this time. Classical

physics did not accept the 'self' or 'mind' as valid entities, primarily because there was no need for these entities. However, in quantum physics, the role of the 'observer' was as important as the role of 'observed'.

The four elementals Earth, Water, Fire, and Air are not to be understood merely in the sense of the term. For example, earth indicates the world of 'solid' substances, and water the world of 'liquids' and so on. Each one of them has some unique attributes that differentiate them from the other. Air possesses touch, and its touch is neither hot nor cold. The air exists as ultimate atoms and as their products. On the other hand, fire possesses a color and touch and it also exists as simple atoms and compounds. The color is white and luminous, and the touch is in the form of heat. Progressing further, water possesses taste in addition to touch and color. Viscidity and fluidity belong to water. Earth possesses smell in addition to the three properties of taste, color, and touch. Ether has the attribute of sound and not the others listed above. It is considered a substance, eternal, and universally present. Table 7.1 lists these differences. As seen in the table, Earth possesses 'smell', which others do not. Similarly, Ether possesses 'sound' which others do not. As we proceed downwards from Earth to Air, the number of attributes progressively come down.

In the Vaiśeṣikan system, 'time' is also considered a substance, unitary, and eternal. It provides a static background against which events happen. Our ability to sense prior, posterior, simultaneous, slowness, and quickness are the marks of the existence of time. Space is recognized from two simultaneously existing bodies fixed in direction and place. It is eternal and all-pervading. Although it is a single entity, the diversity is experienced on account of different effects. For example, using the reference of the Sun, space is perceived as North, East, South, and West, although it is one single entity. In the same manner, by constructing some partitions we recognise the unitary space as a bedroom, kitchen, classroom, etc. Ether, space, and time are not objects of external perception and are inferred in a relative sense from the effects.

TABLE 7.1 Some Attributes of Five Dravyas

Category	Smell	Taste	Colour	Touch	Sound
Earth	✓	✓	✓	✓	
Water		✓	✓	✓	
Fire			✓	✓	
Air				✓	
Ether					✓

According to Kaṇāda, the ātman (Self) is not an empty idea but a real existence. It is neither a by-product of physiological processes nor identical with different stages of consciousness. As proposed in the spiritual traditions, only such persons who have a certain level of spiritual development can experience its existence in conjunction with the mind. The ātman is considered as the substratum of attributes and is eternal. The mind is the internal organ of sense and like the ātman is not an object of ordinary perception. The mind is the organ of internal perception which helps in producing the perception in the ātman through the contact of the senses and objects. In Vaiśeṣika, the methods of perception, and the conditions for this to happen have been laid out in the sūtras. Substances that are beyond the reach of the senses under ordinary circumstances are the ultimate atoms, air, space, time, ether, mind, and ātman.

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7.2.2 Attributes – The Properties of Substances

Attributes are the inherent properties associated with the substances described above. Since they depend on the substances, they do not have an independent existence, nor can they be the independent cause for conjunction or disjunction process⁸. Seventeen attributes have been enumerated in Vaiśeṣika⁹ and the subsequent works expanded it to twenty-four. These are either physical or psychological. Broadly these could be classified under three major heads (Figure 7.4):

- One set of attributes relate to finite substances. These include color, taste, smell, touch, prior and posterior aspects, fluidity, viscosity, and velocity. We have already seen how some of the attributes are related to Earth, Water, Fire, and Air.
- The second set of attributes are related to infinite substances (Ether and Sound for example) or with imponderable substances (such as Mind and Ātman). These include cognition, pleasure, pain, desire, aversion, volition, merit, demerit, impression, and sound. As evident from the list, these are soft attributes.
- The third set of attributes could be associated with both finite and infinite or imponderable substances. These include number, quantity, separateness, conjunction, and disjunction.

Not all attributes could be associated with every member of the group. For example, fluidity and viscosity are related to water. Similarly, number, quantity, separateness, etc. are not relevant in the case of substances of singular existence. Kaṇāda provides a detailed account of the production and destruction of these attributes in Chapters 5–10 in Vaiśeṣika through several sūtras.

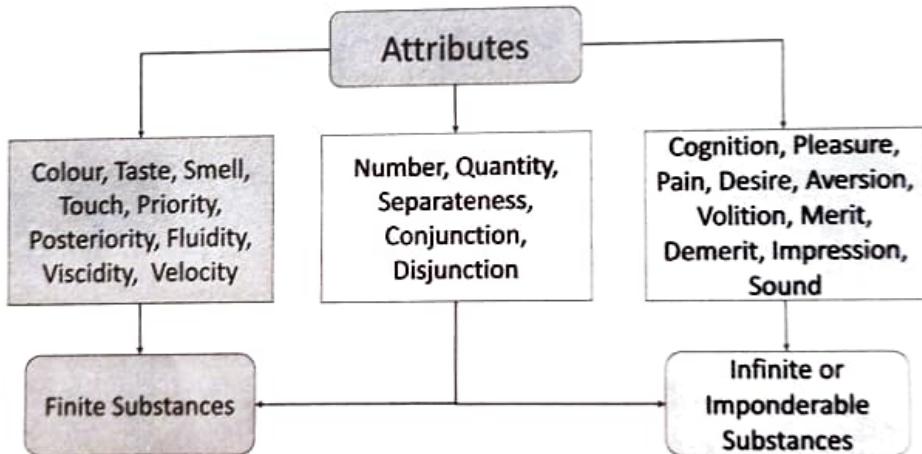


FIGURE 7.4 Attributes and Their Relationship to Substances

7.2.3 Action – The Driver of Conjunction and Disjunction

Action by definition is associated with one substance only. Unlike substances, it does not possess any attribute. However, it drives the process of conjunction and disjunction that occur with respect to the substances which are either single or in a combined form. On account of these properties, the action is not associated with ether, time, space, and ātman as these are infinite substances. Actions are classified into five types: throwing upwards, throwing downwards, contraction, expansion, and being in motion¹⁰. Although ‘motion’ is a generic term for action, its inclusion as one type is meant to include several other types of motions that we commonly experience. This includes rotation, harmonic motion, evacuation, percolation, etc.

Vaiśeṣika spells out the properties that are unique to actions and also the causes of the actions. Actions occur only in finite (corporeal) substances. This excludes other substances such as ether, time, space, self, and mind. Further, actions cannot initiate another action, nor can create a substance. The effects of the actions are felt in its own substratum or other places. For example, a falling ball will have an effect both on the ball and on the surface where it is falling or hitting. Several causes have been identified for action. Gravity is the foremost cause of several actions to happen. Other physical properties such as fluidity, impact, and impulse also cause action. Conjunction (concurrent events at a time or space) is also an important cause of action. However, Vaiśeṣika also includes another cause Adṛṣṭam, that which is not perceived by our senses, for action. Further, conjunction (by means of some impediment) can destroy action. Figure 7.5 summarises these aspects pertaining to action as enumerated in Vaiśeṣika.

- ◆ Attributes are the inherent properties associated with the substances. Seventeen attributes have been enumerated in Vaiśeṣika.
- ◆ Vaiśeṣika has discussed several observed phenomena in the physical world concerning action and motions and establishes certain properties of motion.

Vaiśeṣika has discussed several observed phenomena in the physical world concerning action and motions and establishes certain properties of motion. Moreover, the critical role gravity plays in issues of motion and action have also been identified in the form of several sūtras. Classical physics has articulated them and developed mathematical constructs to model them, which we are aware of. However,

knowledge of these was available to ancient Indians, as evident from the astronomical and mathematical concepts developed in India that pre-dates modern-day developments.

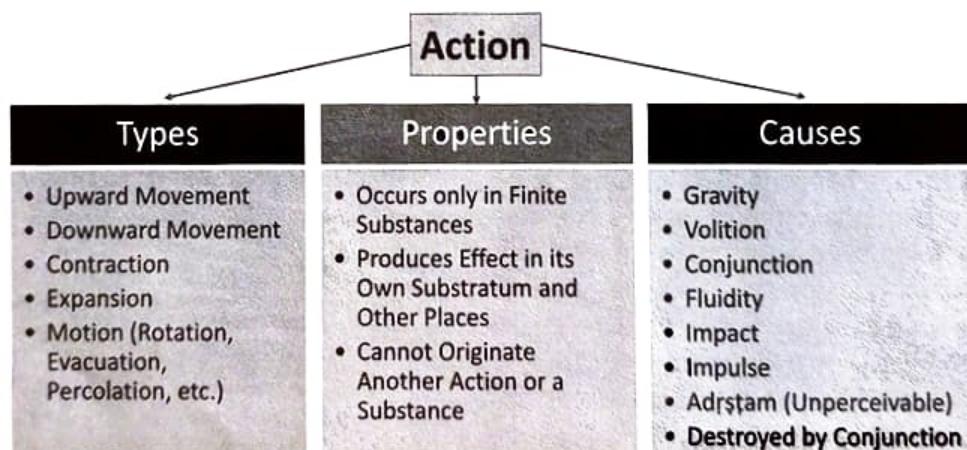


FIGURE 7.5 Action – Types, Properties and Causes

Gravitational Pull

In Vaiśeṣika we find the recognition of gravity causing the actions of throwing up and throwing down. This has been brought out explicitly in the form of some sūtras. These are enumerated below:

- ◆ गुरुत्व-प्रयत्न-संयोगानाम् उत्क्षेपणम् || *gurutva-prayatna-saṃyogānām utkṣepaṇam* || 1.1.29
Throwing up (or upward motion) is caused by the conjunction of effort and gravity. This sūtra establishes that unless there is an effort exerted to counteract the gravitational pull, upward movement of substances may not be possible. In continuation of the sūtra,

the next two sūtras establish the free fall of substances on account of the force of gravity that governs upward and downward motions.

- ◆ संयोगभावे गुरुत्वात् पतनम् ॥ *samyogābhāve gurutvāt patanam* || 5.1.7
In the absence of conjunction (implying some form of impediment), objects freely fall on account of gravity.
- ◆ संस्काराभावे गुरुत्वात् पतनम् ॥ *samskārābhāve gurutvāt patanam* || 5.1.18
In the absence of some propulsive energy generated by the action, objects fall freely on account of gravity.

Properties of Objects in Motion

In modern Physics, we are aware of Laws of motion which defines the notion of inertia. It is because of the inertial force that an object continues to move or loses its momentum. These ideas are articulated in Vaiśeṣika-sūtras¹¹. The relevant sūtras are given below:

- ◆ नोदनविशेषाभावान्नोर्ध्वं न तिर्यग्गमनम् ॥
nodanaviśeṣā-bhāvānnordhvam na tiryag-gamanam || 5.1.8
When there is no particular molecular movement or impulse (implying no external force is applied), there is no upward motion or sideward motion.
- ◆ नोदनादाद्यमिषोः कर्म तत्कर्मकारितात्त्वं संस्कारादुत्तरं तथोत्तरमुत्तरत्वं ॥ 5.1.17.
nodanādādyamiṣoḥ karma tat-karma-kāritācca saṃskārād-uttaram tathottaram-uttarañca ||

The initial action of exerting a certain force causes the motion of an arrow released from a bow; from that momentum follows the next action (of arrow's motion) and so on.

- ◆ कार्यविरोधि कर्म ॥ *kārya-virodhī karma* || 1.1.14
The effect of action (kārya) works against the action.

Since it opposes the original cause that created the motion, perpetual motion is not possible. In classical physics, we recognise this as inertial property. Although the magnitude is not indicated, this sūtra also implies that every action has an opposite reaction.

7.3 PRAMĀNA – THE MEANS OF VALID KNOWLEDGE

One of the components in the knowledge triangle is the means of obtaining valid knowledge. According to the Indian tradition, knowledge is ultimately produced in the 'ātman' and if the generating conditions are sound, knowledge is valid, otherwise, it is defective. Different schools of thought have come up with alternative means of obtaining valid knowledge. According to Nyāya-śāstra, there are four means of obtaining valid knowledge: Pratyakṣa, Anumāna, Upamāna, and Śabda¹².

Pratyakṣa may be defined as perception and is the primary means for acquiring knowledge. Pratyakṣa is nothing but direct perception, which enables one to obtain knowledge from the contact of a sense organ with its object. It is a direct experience of reality by eyes, ears, nose, touch, and taste. This is why the sensory organs are referred to in the Indian tradition as 'Jñānedriyas' (organs of knowledge). Pratyakṣa can be thought of as the ultimate gate to

ferry knowledge into the subtle organs of mind, intellect, and memory for anyone for further processing and internalisation. This process of internalisation will eventually convert the tacit knowledge obtained from various external sources through the sense organs into implicit. All other means of knowledge (Pramāṇas) eventually work in conjunction with Pratyakṣa to generate the right means of knowledge.

The knowledge so obtained is determinate and non-erratic¹³. Suppose there is an auditorium in which a program is being organised. If we are interested in answering the question, "How many people are attending the program?" The most authentic way to answer this would be to do an actual headcount and come to a conclusion, say 392 people are attending the program. In this example, we use our sense organs and count to arrive at an unambiguous answer.

Anumāna is inferential knowledge and is preceded by perception. 'Anu' in Sanskrit means 'follows' and 'māna' is knowledge. Therefore, anumāna points to the knowledge that follows something pre-existing and arrived at in a structured manner by relating to reasons and logic. There are two aspects involved in inferential knowledge. However, there is a concomitance (of the reason (hetu)) which makes it possible to make the inference as the hetu connects the other two aspects. We shall take a simple but a classical example to understand inference. We know that smoke is invariably associated with fire (the concomitance of smoke and fire is the key aspect for inference). If we see smoke on a hill, we conclude that there must be fire on that hill. From the presence of smoke in the hill as qualified by the knowledge that wherever there is smoke there is fire, we proceed to infer the presence of fire in the hill. Suppose if we want to know as to what to infer if we put butter on a gas oven. We can use our repository of inference to answer this question. We know that a gas oven always generates 'heat' by burning the cooking gas. Further, we also know that when butter is heated up it becomes ghee. Therefore, we infer that butter will become ghee when placed on a gas oven. The 'hetu' in this example is the heat which has the concomitance with the gas oven and it connects the butter and the gas oven.

Three types of inferences are proposed in Nyāya¹⁴ (a priori, a posteriori, and commonly seen). In the case of a priori, previous knowledge of the cause will help us arrive at the knowledge. For instance, the moment we see heat being applied, we will be able to infer that ghee will be obtained from butter. In the case of a posteriori, knowledge is derived from the perception of the effect. For example, if we see warm ghee and a hotplate alongside, we will infer that there was butter that has been transformed into ghee. The commonly seen inference is similar to seeing many people walking on a wet road with an umbrella in their hands and inferring that it ought to have been raining in the area.

These are simple examples to illustrate anumāna. However, in reality, a structured logical framework is employed to validate knowledge using either a deductive or an inductive approach. The hetu (reason) is the prime driver of the inferential knowledge and in Nyāya, we have a reasoning logic (called avayava) to generate inferential knowledge, which we will discuss in Section 7.5.1.

Upamāna may be defined as a comparison or analogy. Since new knowledge generation is one of treading the path from 'the unknown' to the known, prior knowledge of related things plays a role in the process. In Nyāya, comparison and analogy obtained on account of the similarity of the unknown to another thing previously well-known¹⁵ are known as Upamāna. It is produced by the knowledge of resemblance or similarity-based on certain attributes. There are two entities involved in analogy, the subject for the analogy (which

one or more attributes, an axis for making the comparison is established through which new knowledge is developed. The knowledge developed is conditional to the choice of attribute but helps greatly in developing a better understanding of the unknown.

For example, with the knowledge of a cow and its physical and behavioral peculiarities, one can tread into the forest and develop a certain understanding of a hitherto unknown animal using attributes derived from the cow and projecting it on to the new animal. Hearing that wild ox is like a cow the person who does not know about the wild ox infers that the animal which looks like a cow is a wild ox. In the Indian tradition, Upamāna is of three types:

- ◆ Sādṛśya-upamāna – In this type of upamāna, the similarity is the important source of knowledge. For example, Rakesh does not know about baseball and asks Ramesh whether he is aware of it. Ramesh tells him that baseball is similar to cricket. Later when Rakesh watches baseball, he gets to know that the sport he is watching over TV is baseball because he remembers the observation by Ramesh that baseball resembles cricket. In this example, upamāna is based on similarity.
- ◆ Vaidharmya-upamāna – In this case of upamāna, the dissimilarity plays an important role in the establishment of knowledge. For example, Devikā is new to the field of engineering. She does not know what a spanner is. But she knows what a screwdriver is. She asks her colleague David, how the spanner looks like. David gives her a description of the spanner as follows, “it does not look like a screwdriver; spanner is a typical screw head that has two holes drilled in it, and the bit that mates with it has two pins that are set the same distance apart as the two holes in the screw head; there are three or four sizes, etc.” Remembering this and seeing a tool dissimilar to the screwdriver with attributes similar to what was being mentioned she concludes that the tool is a spanner.
- ◆ Asādhāraṇa-dharma-upamāna – In this type of upamāna, the knowledge is established based on special quality present in the object or knowledge base. For example, the rhinoceros bears a horn on its nose is a peculiar sign which helps in its recognition and differentiation from the elephant.

There are multiple dimensions on which analogy can be drawn to develop a better understanding of the unknown. In a chemical process, suppose there is a description that the new material after the completion of the chemical process will be like ‘rubber’. It helps the scientist to understand that perhaps the new material will have certain physical attributes such as elasticity. Similarly, if there is a discussion about a rebellion that broke out in the city and the police restoring law and order. If the question was, ‘how did the police quell the rebellion?’ One way to communicate it unambiguously is perhaps to say, “the police dealt the situation with an iron hand”. In this case, the use of the word “iron hand” does not mean the police were all having special hands made of ‘iron’. Rather the comparison and analogy to ‘iron’ are in the context of some attribute of iron such as ‘firmness, hardness, not easy to bend, etc.’ and relates it to the approach taken by the police to put the rebellion to an end.

From these discussions, it is evident that the efficacy of finding the new knowledge depends on the appropriate choice of the attributes to establish the similarity or otherwise between the unknown and the known aspect of knowledge.

Śabda is the verbal testimony of an authoritative expert in the subject. It also includes the authoritative texts of various śāstras composed by reliable experts. There are several

relates to the unknown knowledge), the object for analogy (the known knowledge). Using one or more attributes, an axis for making the comparison is established through which new knowledge is developed. The knowledge developed is conditional to the choice of attributes but helps greatly in developing a better understanding of the unknown.

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Sabda is the verbal testimony of an authoritative expert in the subject. It also includes the authoritative texts of various śāstras composed by reliable experts. There are several

situations in real-life where correct knowledge is obtained only from a reliable source such as an expert. This is simply because the subject matter is not known to many and it may require specialised expertise to analyse and find answers to the questions. Such knowledge is implicitly accumulated over long years of experience by a person of high standing and character. We encounter this often in our daily life. For example, if one develops chest pain and wants to know if there is a heart problem, the only way to find an answer to this is to go to a cardiologist. By virtue of extensive training, specialised knowledge, and deep experiences, the cardiologist will be in a position to resolve this question.

In the Indian tradition, this is accepted as a very important and valuable means of obtaining the right knowledge. In the Nyāya-śāstra, this is referred to as śabda, which is defined as the assertion of a reliable person (expert in the field)¹⁶. In the Indian tradition, the injunctions of the Vedas are considered as śabda-pramāṇa, as it provides instructions on several things that are 'not seen' or ordinarily known to human beings.

Figure 7.6 briefly summarises these discussions in a pictorial form. Direct perception is the basic means of acquiring knowledge and therefore all other pramāṇas will make use of it. The inference will make use of perception and analogy and finally, verbal testimony will make use of all the other three pramāṇas.

प्रत्यक्ष (Pratyakṣa) - Perception

- *How many people are attending this seminar? – 392*

अनुमान (Anumāna) - Inference

- *What will happen if you put butter on a hot plate? – It will become "ghee"*

उपमान (Upamāna) - Comparison and analogy

- *How did the police quell the rebellion? – They dealt with an "iron hand"*

शब्द (Śabda) - Word, testimony of past/present reliable experts

- *Is my heart working normally? – Cardiologist advice*

FIGURE 7.6 The Four Pramāṇas – An Illustration

7.4 SAMĀSYA – AMBIGUITIES IN EXISTING KNOWLEDGE

The search for new knowledge, or for establishing a new tenet begins with the recognition of ambiguity in the knowledge that currently exists, which needs clarification. If a certain issue is well settled and there are no doubts, where is the scope for new knowledge? Similarly, if the issue is totally outside the domain of cognition there is no scope for new knowledge. In the Nyāya framework, the ambiguity is referred to as 'Samāsya'. This marks the beginning of the exercise for new knowledge creation. For instance, there is a lack of understanding of the properties of a certain material thereby leaving ambiguity of its potential applications. This

may call for research and development of new knowledge. According to Nyāya ambiguity in knowledge occurs on account of five reasons¹⁷:

- ◆ When an observed phenomenon resembles several commonly known properties, there is ambiguity in understanding the phenomenon. Since peculiar aspects causing the phenomenon are not distilled, it clutters one's understanding and begs for further inquiry so that the distinctive aspects that make it unique could be identified. For example, in medical research, a new disease caused by a virus may resemble several known medical conditions in terms of symptoms. However, further research may be required to isolate the causes and distill certain unique aspects leading to the medical condition the virus causes. This provides the basis for removing the ambiguity in knowledge and is critical for developing medicines and effective treatment protocols for the disease caused by the new virus.
- ◆ The other reason that causes ambiguity in knowledge is the recognition of properties that have no relation to anything known so far. While it definitely points to a new phenomenon hitherto unknown, it may not provide any explanatory power to articulate what causes the phenomenon and what are the implications of it. In several R & D applications, we encounter such examples. A new chemical process to extract some element may throw results that may not make sense at the outset. Some more research and deep inquiry will help us establish the causes and applications of the new process.
- ◆ The third reason for the ambiguity is conflicting findings from a study. Initial studies may exhibit certain properties. However, further studies may provide results that may conflict with the earlier findings, necessitating further inquiry into the process and searching for new knowledge and insights.
- ◆ Another variation of the conflicting results is considerable variations in the results. An observed phenomenon in a certain condition may get repeated in certain other situations, where we might not have anticipated. This creates a certain inconsistency in our understanding and results in the ambiguity of knowledge. In several studies involving behaviour of people, such results are expected. It merely points to more such number of studies involving greater number of samples and situations to identify underlying patterns and insights.
- ◆ There are also occasions when there is a total absence of our understanding of the problem itself when we study them. We may expect outcomes in certain situations but may not see it. In the extreme, we may not even have an idea of what to look for and where. All these will lead to ambiguity of knowledge on account of total non-apprehension of the issue that we are studying. This often happens in the initial stages of any exploratory study in unknown domains of research.

Figure 7.7 enumerates the reasons. In most of our attempts in discovering new knowledge, we encounter such reasons for ambiguity in knowledge. Identifying the nature of ambiguity that we face and establishing the need and the purpose for removing these ambiguities sets the knowledge seeker on the right path.

◆ Pramāṇa could be defined as the means of obtaining the right knowledge. According to Nyāya Śāstra, there are four means of obtaining the right knowledge.

◆ In the Indian tradition, verbal testimony is accepted as a very important and valuable means of obtaining the right knowledge.

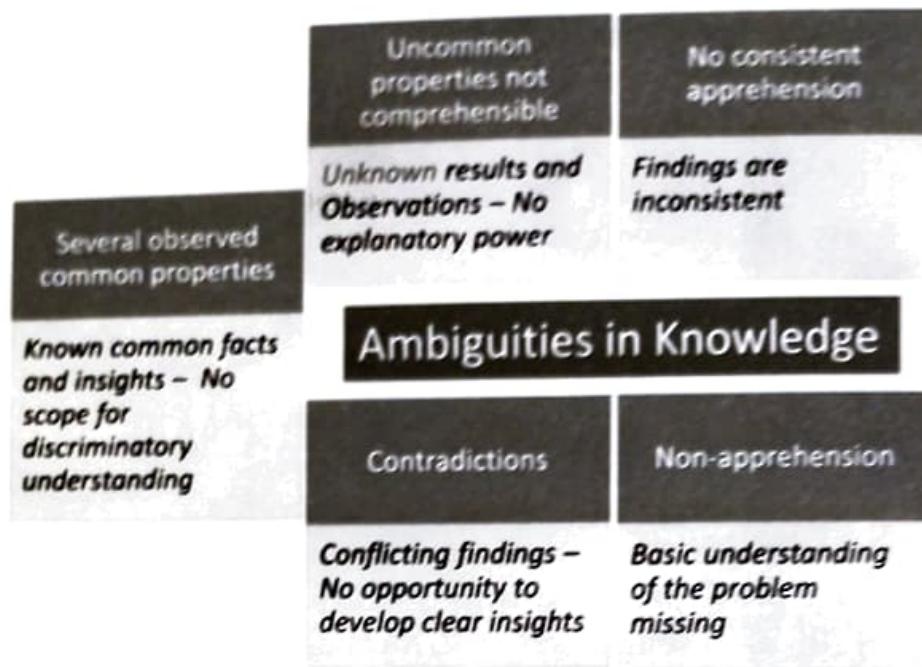


FIGURE 7.7 Causes for Ambiguities in Knowledge

7.5 FRAMEWORK FOR ESTABLISHING VALID KNOWLEDGE

The key contribution of Nyāya-śāstra lies in providing a robust framework for establishing the right knowledge. The very first sūtra in the text begins with identifying all the relevant factors that one needs to take into consideration while establishing the right knowledge. Sixteen categories have been identified and a correct understanding of these and appropriate use of them is critical in the process¹⁸. These sixteen categories provide a comprehensive set of concepts that help one to establish knowledge using a structured approach. Unless the right means of finding knowledge are directed to the object of the study, there is neither a context nor a possibility for a fruitful outcome. Therefore, the governing factors for conducting the study are 'Pramāṇa' and 'Prameya'. We have already discussed these aspects.

Nyāya prescriptions to establish valid knowledge has two principal components:

1. A tradition of debate with a mechanism to navigate through arguments and counter-arguments finally leading to the selection of the most acceptable one to resolve the ambiguity.
2. A methodology for those who want to engage in an honest, friendly, fair, and balanced debate for valid means of exploring new knowledge through a five-step reasoning logic.

Nyāya utilises two key aspects to establish new knowledge; One is a deductive/inductive reasoning framework and the other is a structured approach to debate (argumentation). In an oral tradition, new tenets, and knowledge are established after prolonged discussion (known as Tarka) on matters pertaining to the subject. Usually, there is a vādin (who seeks to advance a new knowledge) and a prativādin, an opponent who challenges the proposer of new knowledge. Based on a series of discussions in which arguments are placed by both sides a conclusion is finally reached on the basis of one convincing the other. This paves the way for advancing the knowledge into new domains. Therefore, logic and argumentation are considered as two main drivers of new knowledge. In the Nyāya-śāstra, these two aspects are well established through a series of sūtras (aphorisms).

On account of the prevalence of an oral tradition to establish knowledge in earlier days, factors 8 to 16 provide mechanisms to engage in the oral discussion. Figure 7.8 depicts a generalised framework for establishing valid knowledge using the categories identified by Nyāya. There are three components in this framework:

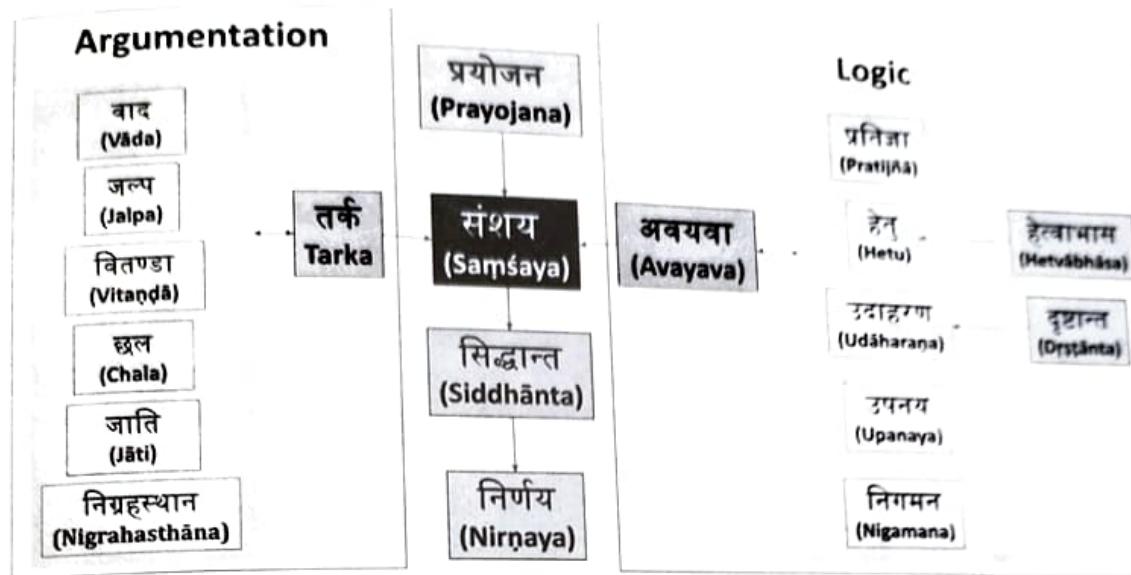


FIGURE 7.8 A Nyāya Based Framework for Establishing Right Knowledge

The middle part sets out the purpose, context, and outcome related to establishing new knowledge. The removal of ambiguity in existing knowledge is the fundamental driver that leads to the creation of new knowledge. Once the issue to be studied is identified, then the purpose of undertaking the exercise, the objectives to be met through the study and the benefits expected to accrue out of the exercise are to be clearly established before the commencement of the study. This is indicated by the factor 'Prayojana'. This helps to direct the efforts in a focused fashion, establish the reason for addressing the ambiguity on hand. The ambiguity is resolved using structured steps identified on the left and the right side of the framework. On account of this, a new tenet (Siddhānta) is established, which is basically, an outcome and verdict of the process adopted. This is finally confirmed and accepted by others (Nirṇaya) and it eventually becomes established knowledge.

The process adopted to arrive at valid new knowledge consists of two broad components, logic and argumentation, indicated on either side in Figure 7.8. The logical part (Avayava) consists of a structured and sequential five-step process that provides a reasoning logic to make valid inferences which provide the ammunition for the debate. The proposition (Pratijñā) is the starting statement which needs to be established to the satisfaction of the opponent. It gives rise to an inquiry necessitating the mention of the reason (Hetu). In the process of using the structured inquiry process, it is important to make use of familiar instances (Drṣṭānta) pertaining to the area of study. This will help find familiar situations and examples (Udāharana) that can build support for the proposition. An example of the application of the proposition is 'Upanaya'. The final conclusion of the proposition is done on the basis of the above, known as 'Nigamana'. Moreover, one must constantly endeavor to make sure that the logic advanced does not suffer from some of the potential fallacies (Hetvābhāsa).

On the other hand, the other component debate (Tarka) can be defined as reasoning in the presence of ambiguity of knowledge using some predefined methods for constructing and weighing up arguments through a structured process. It is primarily meant for the discernment of the real nature of the thing under investigation and imparting the truth, as one understands it, to the other party. Therefore, in a debate there is no consideration of victory or defeat. According to Nyāya principles, debate is to adopt one of two opposing sides. What is adopted is analysed and defended by the aid of any of the means of right knowledge, while its opposite is assailed by refutation, without deviation from the established tenets.

- ◆ Nyāya is one of the six Darśanas which focuses on two important aspects pertaining to the creation of new knowledge: Logic and Argumentation.
- ◆ Nyāya principles have become a very useful tool for experts in all other fields (literature, grammar, philosophical studies, and other fields of knowledge).

it and arrive at a considered conclusion, then these methods are variously employed. Vāda pertains to a constructive discourse that employs the tools of logic with the sole aim of both the parties to arrive at the truth of the matter at the end of the debate.

- ◆ **Jalpa** is a method of argument by one of the debaters with a keen desire to win the debate than necessarily arriving at the truth.
- ◆ **Vitandā** is another form of debate, wherein the debater is interested only in picking errors in the opponent's argument. It is akin to saying, "I know that you are wrong, but I do not know what is right".
- ◆ **Chala** is a method of arguing by simply picking up the loopholes in the opponent's argument and harping on it and thereby deflecting the argument away from the original objective. It is a tactic of distraction and derailment of the process and the outcomes.
- ◆ **Jāti** is a method of engaging in the debate by highlighting the internal inconsistency in the opponent's arguments and highlighting the contradictions.
- ◆ **Nigrahasthāna** is an occasion to raise objections and get the objection sustained by the mediator (as we witness in the modern judicial arguments). It is also an occasion to convince the moderator of a debate that the opponent is wrong and get the opponent out of the debate.

Based on these, it will be possible to deduce an acceptable tenet (Siddhānta) and reach a finality to the study (Nirṇaya) and present the results in such a manner that some useful new addition could be made to the existing body of knowledge. The above framework provides a generic structure for establishing right as well as new knowledge in any chosen field of study. The individual components of the framework warrant more explanation. We shall see some of the components in greater detail.

It is important to know some of the salient aspects of this methodology of new knowledge creation. Firstly, although the above discussion of the Nyāya methodology appears to give an oral slant, the same set of ideas could be used to argue in a written mode as well, although in can be viewed as a generic framework for resolving the ambiguities and creating new knowledge. As is evident from the above discussion, the most appropriate and accepted form

of tarka is väda. However, a vädin must be aware of the alternative tactics that are likely to be deployed by the opponent and guard against these in not getting trapped into an argument. In the absence of this, the discussion may not yield the final result of establishing the new knowledge. Unlike other methods, the debater cannot merely get away by saying 'This is my view' or 'I don't accept your views' but has to substantiate the same using reasoning and logic. Therefore, a vädin will invariably have to fall back on the reason and logic framework to mount convincing arguments in support of his/her view and put forth inferential knowledge.

- The key contribution of Nyāya Sāstra lies in providing a robust framework for establishing the right knowledge
- The elements of a formal inquiry process in search of the right knowledge are enlisted under 'Avayava'.

7.5.1 Deductive/Inductive Logic Framework

Central to the process of establishing new knowledge is a deductive/inductive reasoning framework proposed in Nyāya (known as Avayava). It has five steps in the process¹⁹ as depicted in Figure 7.9.

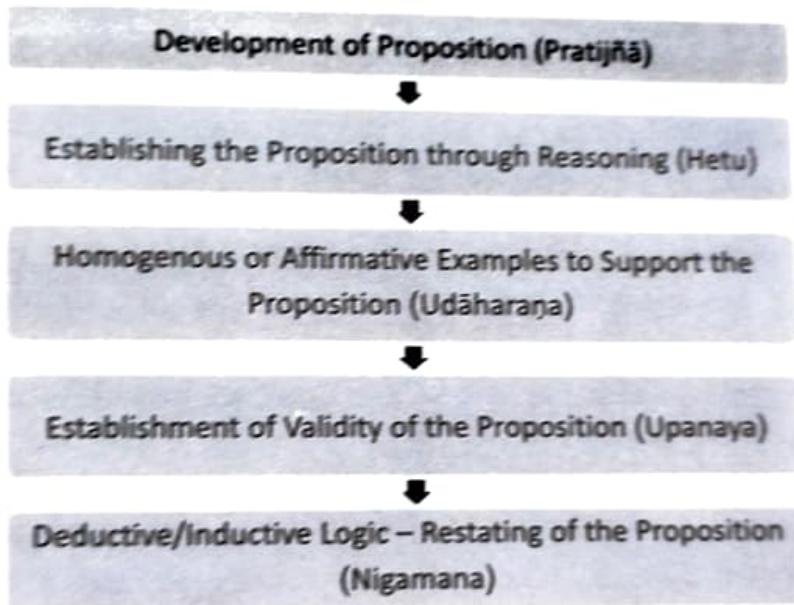


FIGURE 7.9 A 5-step Approach for Deductive/Inductive Logic

Step 1: Pratijñā (प्रतिज्ञा) - Development of a proposition

Deductive/inductive reasoning begins with the development of a proposition for the study. Based on the ambiguity to be resolved and the stated objectives, a proposition needs to be developed. For example, let us start with the proposition, 'Sound is non-eternal'.

Step 2: Hetu (हेतु) - Establishing the proposition through reasoning

Once the proposition is stated, one can draw upon the existing body of knowledge and argue the case for the proposition. In our example, we will reason 'sound is non-eternal' by arguing 'because it is produced'. Whatever is produced is non-eternal and therefore we seek to establish the proposition through this reasoning.

Step 3: Udhāharana (उदाहरण) - Examples for supporting the proposition through reasoning

The theoretical support will merely help conjecture and state the proposition formally and

logically. It requires support in terms of the observed phenomenon. Therefore, to establish the proposition, familiar instances need to be drawn from actual practice. In our example, the supportive observed phenomenon is, 'whatever is produced is non-eternal, as a pot'. In this case, the property of non-eternity is borrowed from the pot, which is a familiar substance. One can also use a counter-example (negative property). For example, whatever is 'not' non-eternal is 'not' produced as in the case of the soul (*ātman*).

Step 4: Upanaya (उपनय) – Establishment of the validity of the proposition

While the previous step may show support for the proposition based on the examples and counter-examples analysed, the validity of the proposition requires that it is sufficiently general and robust to state. This may also require checking for the logical and internal validity of the results. In the *Nyāya-śāstra*, some potential fallacies arising out of the work have been identified. Checking for these fallacies could help establish the logical and face validity of the propositions.

Step 5: Nigamana (निगमन) – Restating of the proposition

Once the above steps are completed, the deductive/inductive reasoning of the proposition is complete. Therefore, what was initially stated as a conjecture could be stated in a grounded fashion by restating the proposition. In our example, we may restate the proposition, 'Sound is non-eternal'.

7.5.2 Potential Fallacies in the Reasoning Process

In the course of establishing new knowledge, the knowledge seeker must be aware of the potential fallacies that can crop up and ensure that these are avoided. *Nyāya-śāstra* has identified five potential fallacies (*Hetvābhāsā*)²⁰. Figure 7.10 pictorially depicts these fallacies that one can encounter while establishing a new knowledge or tenet.



FIGURE 7.10 Potential Fallacies in Reasoning

Avyabhicāra: Erratic conclusions: When it is possible to draw more than one conclusion from a deductive/inductive reasoning approach, it points to an erratic result. This is referred to as Avyabhicāra in Nyāya. Suppose we start with proposition 'Sound is eternal' because it is intangible. Using the example that whatever is intangible is eternal, as atoms, we may conclude that sound is eternal. Alternatively we may start with the proposition that 'Sound is non-eternal' because it is intangible. Using the example that whatever is intangible is non-eternal, as intellect, we may conclude that sound is non-eternal. Here we have drawn two opposite conclusions primarily because there is no universal connection between 'intangible', 'eternal' and 'non-eternal'. Such results of the study will make it erratic and we may not be in a position to make any concrete statement.

Viruddha: Contradictory conclusions: Another possibility is that starting with a proposition A, we proceed in the study and end up with a conclusion (Proposition 'A') which runs contrary to Proposition A. This means our proposition did not have enough support, or that the means that we have adopted were not sound enough. It can also point to the fact the proposition was incorrectly stated while beginning the study.

Prakaraṇasama: The process goes back to the proposition: There may be occasions when the study did not yield anything substantial concerning the proposition. In the process of building support through the reasoning process, it may end up provoking the very proposition for which we are seeking support. Suppose we develop a proposition, 'Sound is non-eternal' and support this with a reason, 'because it is not possessed of the attribute of eternality'. In this case, 'non-eternal' and 'not being possessed of the attribute of eternality' means the same, and the reason begs the question.

Sādhyasama: Unproven proposition: Another fallacy that one can suffer from is the inability to prove the propositions despite the best of the efforts. Unlike the previous cases, there is no directional sense in the findings in this case. The proposition is left wide open for further inquiry sometime in the future. For example, if the proposition 'Shadow is a substance' is argued with a reason, 'because it possesses motion' then this will stand only when we are able to prove that the shadow has motion. The motion may belong to a person obstructed by light.

Kālātīta: Mis-timed or Contextually irrelevant findings: Another fallacy of the process is that findings are not 'in sync' with the time. This is especially true when the tenet is to be established through an oral discussion between a proponent and an opponent of the idea. In other cases, the mistiming of the results can point to the contextual relevance of the findings. If the findings are not relevant because the context in which the results are being applied has changed, then it points to the fallacy of the entire effort.

7.5.3 Established Tenets in a Field of Study

The process of new knowledge creation does not happen in a vacuum. In most cases, it is an incremental process wherein based on the understanding of earlier results and established principles one will be able to hypothesize new conjectures to advance the knowledge. Moreover, deriving some insights from earlier studies become a key component in the process as it will help resolve some of the ambiguities. Therefore, one of the important elements in the field of research and new knowledge creation is the need to be aware of established tenets that already exist. Furthermore, using the logic and argumentation methods, it will be possible to establish a tenet. In Nyāya, four types of siddhāntas (established tenets) have been proposed²¹:

- ◆ Some tenets are accepted by every school of thought as they are fundamental in nature. This is referred to as 'Sarva-tantra-siddhānta' in Nyāya. For example, in the Indian philosophical schools, the existence of the five elements (ether, air, fire, water, and earth) and the five sense organs are accepted by all. Similarly, in the scientific world, the existence of the force of gravity in the earth's atmosphere is accepted by everyone notwithstanding differences between the Newtonian (Classical) Physicists and Quantum Physicists on other tenets.
- ◆ Several principles are peculiar to different schools of thought, referred to as 'Prati-tantra-siddhānta' in Nyāya. This is very common. For example, if we take two schools of health, Āyurveda, and Allopathy, they have different tenets concerning what causes disease in a human being. Even the disease management approach between the two schools differs on account of these differences in the siddhānta.
- ◆ The third variety of tenets, known as *Adhikarana-siddhānta* points to a tenet governing over several other tenets if accepted. Suppose the hypothesis that the existence of water bodies on the Mars planet can support living beings is established through a proper study and accepted, then it means that other tenets related to this are already accepted. These include, for example, living beings need water to survive and several living beings exist when there is water, etc.
- ◆ There is a fourth type of siddhānta, known as *Abhyupagama-siddhānta*, which gets established in an implied fashion, on account of the details that we analyze about an issue. For example, when we accept phenomena such as eclipses, solar and lunar months, etc. it is already implied that the Sun and the Moon have a relative circular orbital motion with respect to the Earth.

Awareness of these concepts is very important for the development of the right knowledge. They help in positioning the knowledge in the right context and ensure that unintended fallacies do not hinder the process. Moreover, it helps to take adequate support from the existing body of knowledge in building several aspects of the new knowledge.

SUMMARY

- ▶ A valid knowledge corresponds to the reality and not anything other than that and is indeed produced by some valid means.
- ▶ Typically, in the Indian tradition, the aspects of valid knowledge could be best understood from the notion of a knowledge triangle, consisting of three components (Pramāta, Prameya, and Pramāṇa)
- ▶ Vaiśeṣika mainly confines itself to 'the exposition of reality' and Nyāya focuses on the issue of 'right knowledge of reality'.
- ▶ Vaiśeṣika presents a systematic framework to describe all the 'nameable and knowable' entities.
- ▶ Six sub-categories constitute existence. The first three, Dravya, Guṇa, and Karma are objective aspects. The other three categories Sāmānya, Višeṣa, and Samavāya are outcomes of intellectual discrimination.
- ▶ The basic building blocks of the physical reality are the Dravya in the framework of Vaiśeṣika. The basic atomic nature of the substance allows the creating of many different things using the principle of Samavāya.
- ▶ There are nine types of substances identified in Vaiśeṣika. These include Pṛthivī, Ap, Tejas, Vāyu, Ākāśa, Dik, Kāla, Ātman, and Manas.

- ▶ Attributes are the inherent properties associated with the substances. Seventeen attributes have been enumerated in Vaiśeṣika and the subsequent works expanded it to twenty-four. These are either physical or psychological.
- ▶ Vaiśeṣika has discussed several observed phenomena in the physical world concerning action and motions and establishes certain properties of motion.
- ▶ Sixteen factors have been identified in Nyāya and a correct understanding of these and appropriate use of them is critical in the process of establishing knowledge.
- ▶ According to Nyāya-śāstra, there are four means available for obtaining the right knowledge (Pratyakṣa, Anumāna, Upamāna, and Śabda).
- ▶ Pratyakṣa is nothing but direct perception, which enables one to obtain knowledge from the contact of a sense organ with its object.
- ▶ Anumāna points to the knowledge that follows something pre-existing and arrived at in a structured manner by relating to reasons and logic.
- ▶ In Nyāya, comparison and analogy obtained on account of the similarity of the unknown to another thing previously well-known are known as Upamāna.
- ▶ Śabda is the verbal testimony of an authoritative expert in the subject.
- ▶ The quest for new knowledge invariably begins with the need to seek clarity on certain issues. According to Nyāya ambiguity in knowledge occurs on account of five reasons.
- ▶ Nyāya utilises two key aspects to establish new knowledge. One is a deductive/inductive reasoning framework and the other is a structured approach to debate (argumentation).
- ▶ Central to the process of establishing new knowledge is a five-step deductive/inductive reasoning framework proposed in Nyāya (known as Avayava).
- ▶ In the course of establishing new knowledge, the knowledge seeker must be aware of the potential fallacies that can crop up and ensure that these are avoided. Nyāya-śāstra has identified five potential fallacies (Hetvābhāṣā).

REVIEW QUESTIONS

1. What do you understand by the term 'Knowledge Triangle'?
2. Given below are statements pertaining to establishing the right knowledge. Identify the pramāṇa applicable in each of these:
 - (a) The constitutional experts advised the Governor on deciding if the Chief Minister enjoyed a majority in the Legislative Assembly.
 - (b) Unexpectedly, chemical A turned blue upon mixing with another chemical B.
 - (c) Alphonso is the king of mangoes.
 - (d) The movie had a bad ending as many viewers came out of the Cinema hall, wiping their tears.
 - (e) The housing colony in the evening glittered like Amarāvatī, the capital of Indraloka.
 - (f) The yoga master asked the person to perform the āsana for 15 days to get rid of his pain.
 - (g) There must have been a big fire as three fire engines have rushed into the factory just now.
3. Comment on the statement, "Vaiśeṣika is an ancient Indian approach to physics".
4. Briefly describe the overall framework of Vaiśeṣika for defining physical entities.
5. Do you see any similarity between concepts of current-day physics and those presented in Vaiśeṣika? What are the points of departure?
6. Enumerate the following as defined in Vaiśeṣika:
 - (a) Substances
 - (b) Attributes
 - (c) Action