

Akasha (Space) and Shabda (Sound): Vedic and Acoustical perspectives

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Abstract

A sequential ordering of five elements on their decreasing subtlety, namely space, air fire, water and earth is stated by Narayanopanishat in Atharva Veda. This statement is examined from an acoustical point of view. The space as an element (bhuta) is qualified by sound as its descriptor (tanmatra). The relation between space and sound and their subtle nature in reference to senses of perception will be presented. The placement of space as the first element and sound as its only property will be discussed in a scientific perspective.

Introduction

The five elements and their properties are referred to in various places in the Vedic literature. An element is the substance (dravya) which has an associated property (of qualities) termed as guna. The substance-property (or dravya-guna) relationship is very important in dealing with human perception and its nature through the five senses. Several Upanishads and the darshana shastras have dealt with the topic of substance-property (see list of references at the end). The sequential ordering of the five elements is a fundamental issue when dealing with the role of five elements and their properties in the cosmological evolution of the universe. At the same time the order of the properties of elements is also fundamental issue when dealing with the perception of elements is also a through five senses. This paper focuses attention on the element-property (or dravya-guna) relation in reference to space as the element and sound as its property.

Ordering of Elements and properties

The mantra or key sentence on which the theme of this paper is based is 'kham vayur jyotiraphah prithivi vishvasya dharini' The meaning of the sentence is given as the 'the universe is borne (supported) by space (Kham), air (vayu), fire (jyoti), water (apah) and earth (pritivi)' The significance of this statement is in the order in which the elements are enumerated. This same ordering of the elements is found in several Vedic references. Also an analysis of the significance of this ordering in connection with corresponding properties is described in the darshana particularly in sastras-nyaya, vaisheshika, samkhya and yoga sutras (1-8).

The order of increasing subtlety in five elements is based on the decreasing number of properties or qualities required to characterizing that element and its substance. In vaisheshika sutras of Kanaada Rishi, it is given as (7).

Earth possesses smell, taste, form and touch

Water possesses taste, form and touch

Fire possesses form and touch

Air possesses touch

The fifth element termed Akasha (space) cannot be qualified by these four qualities namely touch, form, taste and smell. This leads to the observation that the space only be characterized or qualified by sound. However, sound is an additional characteristic to qualify all the other four elements namely air, fire, water and earth. In other words, sound as vibration travel through all these four elements, and produce different effects, which characterize the corresponding element.

This element-quality relationship is also referred in dealing with the order of evolution of the universe. The following statement from Mundaka Upanishat of Atharva Veda reiterates the statement of Narayanopanishat referred to above.

Etasmat Jayate Prano manah indriyani ca
Khamvayurjyothiyotirapah pritivi visvasya dharini (Mundaka -
ii.i.3)

Narayanat prano Jayate manasa sarvendriyani ca
 Kham vayurjyotihi apaha prithivi vishvasya dharini
 (Narayanopanishat)

The two statements are identical in their contents. Their meaning essentially is given as follows:

From this, originates the vital force, mind and all the senses, space, air, fire, water and earth that support the universe.'

The evolutionary order of elements is also stated in a more explicit way in Bramhanandavalli of Taittriyonanishat in Krishna Yajurveda in the following statements [9].

Tasmat va etasmaat atmana akashaha sambhutaha
 Akashat vayuh, vayoragnih, agnerapaha
 Adbhayah prithivi, prithivya oshadhayaha
 Oshadhibhyo annam, annat purushaha

The meaning of the statements is as follows: from that verily, from this self (Atman) - is Akasaa (space) born; from akasha, the air; from air the fire; from fire the water; from water the earth; from earth the plants; from plants the food; from the man.

It is given in the above statements that, the production of elements begins from the all-pervading Atman (Bramhan). Then the first element Akasa is born, here akasha refers to absolute space (which is mistaken for vacuum). This most subtle element akasha is qualified by sound as its property or guna. Then from akasha, air comes into being with two properties or gunas namely touch which is its own and the sound, property of akasha already evolved. Then from air, fire came into being having three properties composed of two preceding and property of form, which is its own. Then from fire was born water with four properties, comprising its own property of taste and the three preceding elements. Then from water, earth came into being with five properties namely smell, taste, form, touch and sound. Then from earth the herbs, the food and the man came into being. Although, it is noted above that vayu is born from Atman assuming the form of akasha, as akasha is only an effect with Atman as source and cause.

The same is true in regard to birth of the other elements for which Atman is the causal source (9). Thus, the elements property relationship can be written from subtle towards gross manifestation as below:

<u>Element</u>	<u>Means of Perception</u>
Ether (akasha)	Sound (shabda)
Air (vayu)	Sound and touch (sparsha)
Fire (agni)	Sound, touch and form (rupa)
Water (apah)	Sound, touch, form and taste (rasa)
Earth (prithivi)	Sound, touch, form, taste and smell (gandha)

It is seen from the above tabular representation that the most subtle and the first element namely ether or absolute space or akasha has only one guna or property, which is sound or shabda. The rest of the elements accumulate the previous properties with the most gross element namely earth or prithivi which has all the five properties which correspond to the five senses. The akasha having shabda (sound) as its only property is also referred to in several literatures. In reference (10), the information given in table above is identically given in sutra form. The akasha-sabda relationship is given by the sutra "Shabdaikagunamakasham".

Thus, the statements referred to above trace the evolution of the great elemental powers, which have brought forth the external as well as the internal universes that is the world that is outside man as well as the one that is within him. The world outside is referred from cosmological point of view. However, so far as the inner world is concerned, as per yoga, their evolution takes place in chakras, which are strung in the sushumna, hence the saying that the chakras are abode of the elemental powers. The chakras namely Muladhara, swadhisthana, Manipuraka, Anahata and visuddhi, correspond to abodes of five elemental powers viz., earth, water, fire air and space respectively. It is noted that in human body the location of the chakras correspond to, the coccygeal triangle at the termination of the spinal cord (muladhara), the source of genitals

(swadhisthana), region of umbilicus (manipuraka), cardiac region (anahata) and the cavity of the throat (vishuddhi) (11).

The yoga maintains that if the mind could reach these chakras and pass from one to the other until it reaches the Center of the eye brows (ajna chakra), then the reverse process of involution will take place leading to the realization of atman (11). This yoga-based implication of elemental powers is only provided as an indication of the wealth of spiritual knowledge both practical and theoretical, which needs to be acquired by a serious spiritual aspirant under a genuine yogi as Sadguru (12). In this paper, as the topic is sound-space relationship in external world, the yoga approach to acquire the knowledge of inner world of a human being is not dealt with in further details.

Sound - only property of Space

Absolute space should not be mistaken for vacuum, as vacuum means emptiness. However, on the contrary, absolute space (ether or akasha) does not mean emptiness. The word akasha does not mean emptiness. The word akasha refers to "avakashasvarupa" which refers to the substance (ether) or element that is spread in all corporeal space meaning the space capable of containing other, elements and bodies (13.14)

It is important to note that the scriptures (shastra) say that the sound is not the property of air, but air is a carrier of sound waves. In modern scientific view also, air is essential for sound waves to propagate. It is said as an observation in vakyapadiya by Bhartrhari that when a letter is uttered the sound (atom like) is propagated like ripples, when a piece of stone is dropped into a lake (15)

Abhranaiva prachiyante sadbakhyah paramanavah

This is similar to wave motion as in vichi-taranga nyaya of Annambhatta in Tarkasamgraha. Thus the sound is propagated from source to listener through the air medium through the mechanism of touch. In other words, when a hard (material) surface vibrates, the vibrations of the surface are transferred to the adjoining air molecules, which again transferred to next plane of air molecules and so on till the air molecules impinge on the

eardrum, and then through auditory nerves, the vibrations are recognized as sound. Both at the source and the receiver i.e., a listener, the property confirms that the air is the carrier of sound but not the substance for sound. This can be further explained using the well-known bell-jar experiment, which is used to show that air, is essential to carry or transmit the sound to the ear of listener. In the bell-jar experiment, when the air is taken out in the jar to create a vacuum, the listener can see the ringing of the bell, which means that the bell surface is vibrating and only the vibrations are not carried further because the air is absent. Changes in air such as turbulence, temperature variations etc. affect the sound waves propagation. This means that the air is the efficient cause of sound but not the material cause, because the efficient cause can destroy the property just as the potter's wheel can influence the pot but not the clay (16).

Given that sound describes the space, this can be practically observed even for the physical space in the audible range. In an enclosed physical space such as a room, the sound characteristics namely decay rate of a impulsive sound (like clapping) depends not only on the hardness of the wall surface but also on the volume of the room, which indicates a measure of the physical space. In acoustical terms, the reverberation time, which indicates sound decay rate, is directly proportional to the volume of the room. In other words, given the density of the air, room temperatures and wall surface hardness unchanged but only the volume of the room is changed, then the reverberation time changes, which means somehow the physical space is qualified by sound. It is also noted that the volume of air has changed due to the change in the room volume (space), which alters the damping characteristic in the room. However, the change in room volume (space) is qualified by the audible sound.

It is known that in cavities and resonators, the change in internal volume influences the spectral characteristics of the sound. It is a common experiences that when a conch shell is blown; the fundamental frequency depends on its internal cavity size and shape. The smaller the size of conch shell, higher the fundamental frequency of sounds in physiological aspects the production of sound and speech is also dependent on the equivalent cavity effects of the vocal tract. It is said in the

process of speech production, the akasha (or space) along with air and heat elements are responsible for sound origination which depending on the details of space (articulation aspects) in the vocal cavity comes out as speech. The elaborate details of speech production process, is dealt in Sanskrit language by great grammarians such as Panini Maharishi (17 to 22). Thus we can say that the space determined by boundary conditions influences the sound both in amplitude and spectral contents. In other words, 'only sound qualifies space'.

Concluding Remarks

The paper presents a brief study of the sequential ordering of elements as given in Upanishads of Vedas, namely, space, air, fire, water and earth and their corresponding properties sound, touch, form, taste and smell. This ordering is not arbitrary, and it is based on the decreasing subtly and increasing gross nature of elements. It is noted that the space is qualified by only sound although the remaining four elements can also be qualified by sound in addition to their respective properties.

The space-sound relationships have implications both in external physical world as well as inner physiological world. The external (physical) implications include the acoustical aspects such as reverberation characteristics of rooms, internal cavities in musical instruments and the noise from cavity flow interactions in nadayoga aspects, which include the mind, breath, heat and interior space in production of audible sound which further evolves into speech, chants and music. This brief article indicates the depth and scope of sound with its relevance and importance to life and human life in particular.

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