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Śūnya-Kathā or interplay of *being* and *nothingness*

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Abstract:
Devising means of expressing *nothingness* comprises a significant part of global history of ideas. Though representing *nothingness* is having an underlying oxymoronic tone, the concept of *śūnya* or *nirākāra* can still be considered as one of the primordial archetypes of human thought process which continued to express itself in different ways in mathematics, philosophy as well as in different psycho- somatic variants.
Here we will give a brief outline of the development of understanding of *śūnya* in different Indian traditions and the ways one can be engagedtoday with these from modern logical and empirical perspective.

Key words: *śūnya*, *avyakrita* ,*catuṣkoṭi* , inconsistency , quantum gravity, N*āgā*rjuna, Chandrakīrti, Wheeler ,quantum cosmology

Introduction

It is interesting to note that along with our well-defined knowledge of something having *form* (*ākāra*), *formlessness* or *absence of form*(*nirākāra*) or *nothingness* is also something complementary which we can mentally conceive(though vaguely) in one way or another . Though categorically very different, concept of *nirākāra* continued to be hosted in prolific variants in human thought process from the time immemorial. In fact the concept of *nirākāraor nothingness* can be surely identified as one of the essential archetypes of our primordial guiding metaphysics. Concept of *śūnya*, being a special version of *nothingness*, is known to have configured itself parallelly in philosophical as well as mathematical literatures. While it took a long time for *nothingness* to evolve as a numerical digit in its present form **0**, conceptual evolution of *nothingness* can be traced rather unambiguously as a semantic category even in Indian proto-philosophical literatures. In fact this is not exaggeration to say that a significant part of the Indian philosophical literature can be characterized as an outgrowth of early interplay of the concept of *being* and *nothingness*. Apart from this, different *trans-binary* modes of reasoning, for

example in terms of *catuṣkoṭi* or like as a general schema, can also be traced in the cultural ambience of the historic Buddha.

In section **I** we will give a sketchy outline of the early appearances of the concept of *nirākāra* or *śūnya* in different knowledge traditions developed in India , and *catuṣkoṭi* in relation to that - the treatments of *nirākāra* or *formless as* different forms of logico-epistemic as well as psycho-somatic supplementary of the process of understandings of the interplay of *being* and *nothingness*.

In section **II** we will explore some possible modern engagements with the traditional standpoints, specifically about the unanswerable questions or *avyakritas* as well as *catuṣkoṭi* – whether *catuṣkoṭi*- particularly the *both* option, can still serve as effective framework to talk about the first two sets of *avyakritas* .

2. Concept of *śūnya in* early Indian literature

Though it is difficult to trace the concrete historical evidence of the precise genesis of *zero* as a numerical digit, conceptual analogue of *zero* as *nothingness* or absence of form (*nirākāra*) can be traced in early Indian literature of different schools of thought. Presence of *nothingness* in grammar and rhetorical form as a distinct semantic category can be surely traced back even to the pre-philosophical literatures.

The word *śūnya* is found in Ṛ*gveda* where it means emptiness, lack or *absence* of something.

नासदासीन्नोसदासीत्तदानीं नासीद्रजो नो व्योमा परो यत्। NāsdīyaSūkta

Here *śūnya* was configured as creative void.

Pāṇini used the word *lopa*, while *Patañjalī* used *śūnya* in context of metrical calculation. *Pāṇini* talked about a rule of *adarśhanaṃ lopa* (non-appearance or non-availability) in context of grammatical reconstruction in his monumental work *Aṣṭādhyāī* (I.I.60) .

In fact the rule of *lopa* and some other linguistic rules of *Pāṇini* for deep structural analysis of Sanskrit language are possible to be *interpreted* as grammatical ancestor of the concept of *śūnya*. Though it is difficult to exactly

date *Pāṇini*, scholars used to place him uncertainly within 6th -4th Century BC. By this time the oral categorization of *Buddhavacanas* in terms of three *Pitakas* was perhaps nearly completed, and concept of *śūnya* appeared there in new philosophical guise. But it is not possible to say that whether, the grammatical ancestor of *śūnya* was an outcome of influence of pre-philosophical or mathematical community of contemporary India.

But whatever is the factual sequence of influences, prolific modes of talking about *nirākāra* or *absence*, that is to say, *formlessness* were in reasonably good shape by that time. As stated by Allen Bloomfeld, " The Hindus hit upon the apparently artificial but in practice eminently serviceable device of speaking of zero element."

In fact *kha, vyoma ,ākāsa, gagana , ananta ,Pūrna* all are among the oldest Sanskrit synonyms of *śūnya . Kha* represents one of the most ancient Sanskrit terms for *void*, which denotes the nave of wheel - the empty space enabling motion and dynamism. So, we see that quite a handful of linguistic representations of *nothingness* were there even in the early Indian literatures.

2.1: *Ākāsa* is traditionally identified with *Śūnya*

Locating *śūnya* inside our Body

Śūnya, being synonymous with *ākāsa* , which is considered to be a special category of *bhuta* , can also be described as one of the proposed five compositional elements - *khiti ,ap ,Teja, Marut ,*v*yoma* (*ākāsa) .* We are composed of *śūnya!*

Psycho-somatic versions of *śūnya in* early *Yogic* as well as Tantric Schools can be made better sense with this ontologically *amphibian* character of *śūnya* in view. Attaining different forms of *void* is considered to be the goal of spiritual practices of different non-dualistic Tantric Schools. Stages of spiritual experience are described as different forms of *void* in *Srīvijñan Bhairava* - one of the oldest Tantric Schools of non-dualist *Kashmir śaiva.*

Srīvijñan Bhairava articulates about *śūnya* many times. However this is not merely a physical absence or *abhāba*. *Śūnya* in *agama śāstra* is something about the depletion of all *bhābas* which can be translated as closely as possible perhaps by 'descriptive features' –

अशुन्यम् शुन्यमित्तोक्तम् शुन्यंचवुच्चते

अभवस समुद्दिश्तो यत्रियं भवक्षयं गता।

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This way *śūnya continued* to play the role of cryptic guiding metaphysics in different versions of Indian Holism which can be generically termed as *Pindabrahmāndvāda-* ब्रह्माण्डे ये गुणाः सन्ति ते तिष्ठन्ति कलेवरे (*Dehabhānda (body) encodes the brahmānda* in capsular form .) This is the basis of the described means of liberation in *Tantra* – awakening of *kundalīni.*

तनूदेशे शून्यतैव क्षणमात्रं विभावयेत्।
निर्विकल्पं निर्विकल्पो निर्विकल्पस्वरूपभाक्॥ ४६॥ Kārikā, SrīvijñanVairaba

[If one concentrates on the body as a void even for a moment , with the mind free from thought , then one attains thoughtlessness and verily becomes that form of void (known as *Bhairava*)]

नित्ये निराश्रये शून्ये व्यापके कलनोज्झिते।
बाह्याकाशे मनः कृत्वा निराकाशं समाविशेत्॥ १२८॥ Kārikā, SrīvijñanVairaba

[Fixing the mind in the outer space , which is eternal, without support, void, omnipresent and beyond estimation or calculation ,one enters into formless unmanifest dimension.]

However, it will be of no great help to increase the number of *ślokas* as they are neither our first-hand experience nor empirical statement! These are *Apta* or part of Dialogue between *bhairava Shiva* and *bhairavī Parbatī*. These are accepted as the authentic statements of possibility of 'experiencing' *śūnya.*

This way, the concept of *śūnya* or *nirākāra* can be described to have gnarled its ontologically ambivalent way down the conceptual evolution of our understanding of *being* and *nothingness.* This can also be described as a kind of *bridge entity* between subtle and gross components of human existence - spiritual as well as mundane.

2.2.*Śūnya* in context of the debate on the eternal chain of existence ... Soul or no-soul

2.2.1. Liberation from rebirth and Vedic *yajña*

If there are something primordial and archetypal in human thought process, one of the most significant is perhaps the concept of *karma,* collaterally coupled with the belief in *eternal soul* and *rebirth* ! No one knows how old is the idea of *sin* and *virtue* as a result of *karma,* and rebirth as a collateral mechanism of these all as a whole. *Karma* can be seen very much as another ambivalent concept in this way because, according to the standard versions of belief, something done 'here' in one's own lifetime is subject to a mysterious book-keeping process "somewhere" in an unknown transcendental level.[1]
Large majority of human being, even after 350 years of scientific revolution, are still prone to believe in a cycle of birth as a consequence of *karma* .We need not bother now about the epistemic warranty. In fact, pre-philosophical literatures are full of considerations stemming out of these issues - how to get rid of *sin*, how to perform some virtuous rituals in order to confirm an escape route from deeds etc. It is interesting to note that people were more or less deeply scared of recurrent life cycle as it seems from the early Indian historiography in different forms. [2]
Eventually *Mukti* or liberation from rebirth was considered to be an ultimate goal of human life!

But how to ensure *Mukti* or liberation?

There was a sharp difference of opinions among the ancient contemporaries in question of means of liberation. The whole gamut of *Karma or Pūrva-Mīmāṃsā is* a reflection of this debate – debate over *Vedārtha* or proper interpretation of *Vedic mantra* – its application (*biniyoga*) in meditation(*dhyana*) or *yajñik karm*a .Goal of this *śāstra* is also *Mukti* , but strictly through the performance of *yajñik* ritualistic *karma*. *Vedic yajña* had been advocated as means of *attaining swarga ,* though this was not accepted by all contemporary schools.

The *yajñik* sacrificial rituals affiliated to *Vedic* origins and all those, which continued to serve as a bridge between mundane and transcendental, can be seen as something which has its foot in both worlds.

Parallel to the *Vedic* advocacy of *yajña* as means of liberation, there was famously many radical sects of soteriologists like the *cārvāka* and the *ajīvikas* , who believed in renunciation or withdrawal from *karma* to cut the root-

possibility of accumulating *karmafal or deeds!* Within the intended scope of this article, we need not get into further details.

2.2.2. Buddha related *śūnya* with *Dukkha*

The Buddha came up with an altogether new suggestion in this pre-existing debate - there is *no self*, *no soul* though there is *rebirth*! There is no enduring self or permanent eternal soul, but only a flow - a universal flux implying something like *śūnya.* He famously did not endorse *Vedic yajñik* rituals as means of liberation.

This way *śūnya* appears in earliest Buddhist teachings in context of the old debate of permanence and impermanence of soul, *yajñik* ritual or no-ritual. Admittedly this *śūnya* was connotationally different from its grammatical, *ṚgVedic* or T*ā*ntric ancestors.
However, the presiding metaphysics of Buddha's concerns of *śūnya* was *Dukkha or sufferings*- one of the most mundane experiences of human life.

> सर्वं क्षणिकं क्षणिकं दुःखम्।
> दुःखं स्वलक्षणं स्वलक्षणं शून्यं शून्यमिति।।
>
> *Sarbadarśan saṃgraha*, compiled by M*ā*dhab*ā*ch*ā*rya

It is difficult to trace the definite origin of relating *śūnya* with *Dukkha*, but *Dukkha* always played a significant role in Indian philosophical developments. All the major philosophical schools admit *Dukkha* as one of the *prameyas*.*Sāñkhya* - the oldest philosophical school of India addresses *Dukkha* as one of the central issues of concerns.

दुखत्रयाभिघाताज्जिज्ञासा तदपघातके हेतौ ।:
दृष्टे साऽपार्था चेन्नैकान्तात्यन्ततोऽभावात् ॥ १ ॥ S*ā*ñkhyaK*ā*rik*ā*

One must take note that, this *Dukkha*, though mundane, is not about something of our everyday concern, for example, of not having the latest version of smartphone or LED TV set or like. This is an intrinsic part of our existential cycle.

Buddha's treatment of *Dukkha* can be thought to have a clear imprint of *Sañkhya.* Basically the Buddha endorsed the pre-existing tradition of withdrawal from *Karma* within a new framework of *Nairātma* .

Catuṣkoṭi or four alternative possibilities had a special role to play right in this regard as prior to *śūnya.Catuṣkoṭi* was endorsed in the famous set of four questions known as *avyakritas* in traditional literature -

- Whether the world is *eternal,* or not, both or neither

- Whether the world is *finite* (in space), or infinite, or both, or neither

- Whether the *Tathāgata* exists after death, or doesn't, or both, or neither

- Is the soul identical with the body or different from it? [3]

Signature of *catuṣkoṭi* or four alternatives is quite explicit in this set of questions here except the last one!
In fact, the practice of applying *catuṣkoṭi* in reasoning was quite prominent in the intellectual circle of the historic *Buddha. Sanjay Belatthiputra* – one of the senior contemporary *Ajīvika monks of* the Buddha is seen to use *catuṣkoṭi* in his arguments. Queen Mallika in her dialogical engagement with the Buddha himself is seen to ask these very questions. [4]

But the Buddha is known to have firmly denied to answer these questions. His *Silence* to these questions is traditionally considered to be a significant thumb rule to get into the right track of making sense of *śūnya* as ineffable and beyond these four standard means of cognition. In fact the Buddha's proposed alternative to Vedic ritualistic means for liberation was spiritually attained *śūnya* or *nirvāna.*

This position cut right through the relevance of *yajñik* rituals in question of assuring *Mukti*- it leaves hardly any sense to relate birth cycles as well as *sin* and *virtue*, or the escape mechanism with practicing *yajñik* rituals ! Moreover, the possibility of anyone to exist *eternally* as a spiritually self-conscious being (*ātman)* in advocated *swarga* was also ruled out.
So, to put the whole new perspective in brief - the *Buddha* affirmed the denial of reality of *ātman* as a permanent eternal substance with diachronic identity. Reality was considered to be a continuity or universal flux of momentary entities governed by causal law of interdependence –*pratītyasamudpāda* ..

But these all at the same time led to severe conflicts with the way we understand things from our ordinary human perspective -

- If the things and persons in the mundane reality are nothing more than changing flux, then how is it possible to ensure a person to have an orderly experience of the world of permanence always tagged with identity?

and

- If there is no enduring entity or self, how is it for someone to be liberated? or equivalently, how is it possible to account for the difference between an enlightened being like the Buddha and ordinary ones like ourselves?

Early Buddhist philosophy is largely an outcome of defence against these questions which is substantiated in *Abhidharma.*[5]

Within the intended scope of our present article, we need not get into any more details of the elaborate literatures of defence.

2.3:*Śūnya* in M*ā*dhyamik Buddhism

N*āgā*rjuna and destruction of ontology and epistemology

This way the concept of *śūnya* in Indian tradition tied up the concepts of *ākāsa , void , ākāra , nirākāra , soul or no- soul* with *Dukkha , karma , rebirth ...*

So we see the concept of *śūnya* to have moved over a wide spectrum of multilayered meanings which includes the concept of *ākāsa* on the one hand with prolific interpretations of *karma,soul,rebirth* ...on the other in its single fold.

However, a lot of "juice" was still left for N*āgā*rjuna! N*āgā*rjuna interpreted this further as a radical generalization in terms of suspicion about the ontological implications of verb ' to be ' as a whole.

N*āgā*rjuna definitely received his training in *Abhidharmik* school. His *Mūlmādhyamika* K*ā*rik*ā* famously systematised the *śūnya* doctrine of *Prajñāpāramitā sūtra. Nairātma* received here a deeper interpretation than ever-more radically speaking, there is no change, no origination, no cessation, no coming in or going out - the *real* is neither one, nor many, neither *ātman* nor *anātman* ; it is as it is always – a ceaseless continuation characterized by

mutual dependence . Origination or decay etc. is imagined by the uninformed, they are speculation or *dristi* indulging ignorance or *Dukkha*. Reality is devoid of any essence or *swabhāba* ; this is synonymous with *pratītyasamutpāda* .

The root cause of *Dukkha* or getting tied up in eternal cycle of rebirth was advocated to be in our habit of indulging *Dristi* or *Kalpana* which is based on our four erroneous means of cognition -*catuṣkoṭi* .
These means are erroneous because the *real* is utterly devoid of any conceptual designation based on our means of cognition! Real is transcendental and can only be realised in non-dual language of *prajña.* This is *śūnya-catuṣkoṭibinirmukto - beyond* the duality of being and non-being - neither existent nor non-existent, neither one nor many and this way *acintya* or beyond words or conceivable knowledge! This is not to be confused as a theoretical standpoint, but rather a statement about reality as it is captured in pure intuition. In N*āgā*rjuna's own statement – नास्ति च मम प्रतिज्ञा। । बिग्रहब्याबर्तनी ।। २९।। कारिका

So in view of this panoramic perspective, we can say that, *śūnya* was hardly considered in Indian theoretical tradition merely as a non-interactive physical vacuum in objective sense. The *karnel* of *śūnyakathā or* conceptual interplay of *being* and *nothingness* continued to evolve mostly around *metaphysical or psycho-somatic* considerations.
N*āgā*rjuna's standpoint can be considered to be as an extreme in this spectrum, which effectively implied a seeming disaster from epistemic point of view – nothing whether metaphysical or everyday empirical can be known in an unequivocal sense. This amounts to say that, there is no quantifiable epistemic difference between *Truth* and *falsehood* – no one including even the Buddha has ever uttered one true word – all conceptions including that of enlightened being would fall short of *Truth*!
This way *catuṣkoṭi* is employed to exhaust all the ways in which the verb ' to be ' may be used in assertion – is of something , is-not , both is and is-not and neither . N*āgā*rjuna and his most devastating commentator *Chandrakīrti*(7TH CE) seems to have rejected *catuṣkoṭi* as well as the ontological implications of verb 'to be' in all four ways language is being used ontologically. However one must be careful to note that this seeming epistemic disaster has a deep ethical significance as it teaches detachment from things on which we attribute valuation based on our *false* imagination (*mithyādristī*).[6]

This way the conceptual evolution of *śūnya* implies connotational shift from *ākāsa* in one extreme towards the problem in the standard ontological implications of verb 'to be'. In *Mādhyamik Buddhism, ākāsa i*s not merely an

instantiation of absence of reality and identity, but something transcendental! *Ākāsa* transcends duality of absence and presence, reality and unreality which is *śūnya* .

This happened to be a permanent issue of later Dialogical engagements between the *Vedāntin*s and the *Buddhists* . In fact *ākāsa* continued to play a significant role in the debate between Buddhists and *Advaita Vedāntins*. As described by Halfbass–

" While Vedantins such as Gaudpada use *Akasa*to illustrate the notion of limitless, ubiquitous and uncaused atman/ *brahman,* Buddhists such as Bhavya turn this around. All these attributes which according to the *Vedantins* indicate the supremacy of the *Atman* demonstrate according to Bhavya nothing but its utter lack of reality. " [7]

How can that which has no cause (*hetu*) be an entity (bhāva)? It is [therefore, unreal] like the son of a barren woman *(bandhyātanaya*) .

2.3.1. The vexed notion of *being*

Traditional story of *śūnyakathā* from *Pāṇini* to *Chandrakirtī* can be taken to have terminated here. What we narrated here can be generically described as account of more or less anthropocentric developments of the concept of *śūnya*. What can be there to add any more to this prolific conceptual dynamics?
What can possibly be the modern ways of engagement with these traditional developments of *śūnyakathā*?

This is the question we will address in the second part …

After this brief survey of such a panoramic perspective, we see that, in Indian tradition *śūnya* was never considered neither as *contradiction* nor as something which Nature admits in naïve realistic sense as *objectively* out there .[8]
Though it might be a tall claim to say that these all confirm some early Indian notion of *being* that might explain the difference with the Western traditional treatment of *absence* or *formlessness*, it can't be denied that Buddhist tradition developed several distinctive accounts of *identity* and *individuation* that might have few, if any, parallels in Western traditions. We need not get here into further details. [9]

But one must take note that the development of the *śūnyakathā* in West did not proliferate the way as it did in Indian tradition.Representing *formless* or *nothing* was considered to be a meaningless endeavor in early Western traditions, particularly in Greece. Greeks were famously against admitting *emptiness*. It was considered to be an absurd proposition to represent *Nothingness.* Following Aristotle, European knowledge dynamics were not entertaining to admit *śūnya* or emptiness as a viable ontology. The theoretical tradition of West –largely under the Greek legacy, was against emptiness or physical vacuum for a long time, unless there were Toricelli(1644)and Paskal who demonstrated that Nature did really host physical vacuum! [10][11]

So the entire notion of *being* and *nothingness* seems to have revolved around different pivotal nodes in Indian and Western tradition.

II

3. What can be our best way to engage with *śūnyakathā* today from modern perspective?

How should we engage ourselves today with these all traditional developments of our understanding of *śūnya* in its prolific variants? Zero in mathematics had been standardized for long in decimal place value system. Modern linguistic is reasonably ahead now of *Pāṇini's* time to use *śūnya* in terms of the rule of *adarśhanaṃ lopa* as *Pāṇini* did. Mystics have their own way to negotiate with *śū*nya as spiritual experience. What about the possibility of a physicist to be engaged with the concept of *śūnya* and *catuṣkoṭi* today?

At its outset no physicist will accept the epistemic disaster advocated by *Nāgārjuna*. It is not possible to do physics without indulging *Dristi* or mental constructions or presuming at least the two means of cognition as unambiguous – yes and no of *catuṣkoṭi*.
But this apparently different looking paths of *Nāgārjuna* and modern physics seem to come closer to each other from other way around on the basis of some modern developments in understanding the role of identity and individuation in quantum mechanics - human perspective of the concept of identity seems to be wrong or at the most provisional construction which is also at the heart of the Buddha's teaching. Stated in other words, ontological implications of verb 'to be' have been turned out to be equally enigmatic in view of the recent

developments of modern physics. Unfathomable problems seem to underlie the meaning of the word 'is'! [12, 13, 14]

We will approach the question of modern engagement with the traditional versions of first two sets of *avyakritas* as our point of entry .We will talk about the possible updated status of *avyakritas* - what can be said about the first two sets of *avyakritas* today which were considered to be unanswerable in traditional literature . Does it make more sense to talk about updated versions of *avyakritas* today in view of the recent developments of modern cosmology?

3.1: *Avyakritas* from modern cosmological point of view

Let us start with the possibilities of updating the first two set of the *avyakritas* in their traditional formulations -

- whether the *Prithvi* is *eternal,* or not, both or neither

- whether the *Prithvi* is*finite* (in space), or infinite, or both, or neither

These questions are definitely among the most difficult ones to answer unambiguously even today after 2500 years of their tentative formulation. But the question is that, instead of categorising them strictly as *avyakrita* or unanswerable any longer today, we now have different framework to talk about them - the framework of modern cosmology which was born in 1917 with *General Theory of Relativity (GTR).* It is not entirely clear what *Prithvi* was meant for in its original version - the universe as a whole, or only the Earth itself. Whether the universe is finite or eternal is a question which is addressed today by the modern cosmologists for which GTR is the accepted framework of assessment.
From within this framework, we can say that, these are no longer questions to remain silent about as is traditionally advocated. We now know definitely more than what it was there during the composition of early Buddhist literatures.

Of course, though the question of size of the universe is basically an empirical issue, this is not very straightforward due to many reasons. Existing telescopes show the *far away* galaxies to be scattered throughout the space in a more or less uniform pattern. But astronomy is not just a technical matter of devising more and more powerful telescopes to probe deeper and deeper into the space, and to conclude simply on that basis. On the contrary it is far more complex to make sense of the size of the universe.

Within the scope of this article it is not possible to give any detailed account of this, but let us give a two minutes outline to present the essential points .

George Gamow put it very aptly nearly 70 years back - "... suppose astronomers go on building 400 inches, 800 inches, 1600 inches, etc., telescopes. What will they find?"[15]
In fact, decision about the size of the universe is not only a matter of building telescope with ever increasing apertures. There are now telescopes all over the world like James Webb, Hubble Telescope and like with apertures much bigger than Gamow envisaged 70 years back.

Gamow continued -
"Einstein's general theory of relativity and gravitation leads to two possible mathematical alternatives.
The first is that the space of the universe may "curve in" in the manner of the surface of the earth (positive curvature) and finally close upon itself in an "antipodal point". This is Einstein's close universe (which can be either static or expanding), in which barring space obscuration, one could manage to wait for several billion years while the light travels around the universe. Or else the space of the universe may " curve out " like the surface of a western saddle."[16]

So decision about the correct alternative is not entirely an empirical issue, as this is not just about "seeing" or probing "what there is" through bigger and bigger telescopes.
In fact, though astronomy is empirically about capturing *light coming* from the luminous materials, we can't do any experiment with the universe other than to arrange devises to receive light, and linking distant galaxies through most sophisticated telescope.

But how far?

One must keep in mind that as light takes finite time to travel, " seeing" a distant galaxy *now* is actually seeing it as it *was* when light *left* it - may be billion years back, not as it is today. This is the simplest *Time machine* which Nature provides for us! We can see the distant past just by looking.
But this imposes a permanent cosmological limit to the possibility of what we can know about the universe. We can describe this limit as defining parameters of modern version of *avyakritas*.

As a matter of fact, our visible universe is a small fraction of what we can conceive as universe as a whole in the sense of *what there is*. As the visibility is

conditioned by the finite speed of light, our visible universe has to be an enormously big but finite spherical region cantered on our location (here, now) as observer, with a radius of what distance light travelled ever since the universe began. So all that we *can* see, lies, in principle, within the boundary of this visible universe - *horizon*. As *seeing* is equivalent to *knowing*, this *horizon* constitutes the built-in limit beyond which *no* information would reach us.

As we mentioned, that Einstein's equations admit two alternative interpretations, which effectively allows both *finite* and *infinite* universe! But we can't make any verifiable statement about the universe beyond horizon. If it is *finite*, then our visible universe happens to be a finite fraction of it; if this is *infinite*, our observation can only deal with an infinitesimal fraction of the whole.[17]

Here I must mention that nearly 50 years back the difference between the visible and inaccessible enormity of the universe was more or less ignored because cosmologists had no good reasons to believe that universe could be structurally very different beyond our *visible horizon*. But the situation gradually changed over the last few decades - the new versions of the origin of universes provide compelling reasons to expect the universe to be different beyond our horizon.

Apart from this, *quantum cosmology*, that is to say, the question of applying quantum mechanics to the whole universe provides an additional twist to the whole issue. Quantum cosmology is conceptually an extremely tricky game so far the present (unsolved) status of *quantum measurement problem* is concerned.

Measurement problem in its earliest version was appeared first in Schrödinger's paper of 1927 .Stated simply , this is about the formidable difficulty to formally justify(in terms of a *mechanism*) the *emergence* of "our" world of everyday experience from a primordial level if accepted to be governed by quantum mechanical rules. So the question which compellingly suggests itself is that, how Schrodinger equation- governing quantum reality accommodating infinite coexisting possibilities , *ceases to be effective* any more to allow our "reduced" (exclusive either-or) possibilities world to take over? This is Measurement problem which is fundamentally about an *unbridgeable* Dualism. From technical point of view, *measurement problem* is about the question of whether the *measuring Apparatus* or means of observation can or can't be *internalized* within the formal framework of quantum theory to make sense of the single measurement outcome we normally perceive.

But this question seems to loose import in quantum cosmological context, as in quantum cosmology the observer cannot be treated as *outside* the universe for obvious reason. Nothing to do about this as we mentioned earlier that we can't do any experiment with the universe other than accepting just what is given. It doesn't make sense to assume observer *outside* the universe. In fact usual

interpretations of quantum mechanics are about observer *outside* the system, but this can't be so when it is the whole universe which is in consideration.

There are standard equations, which define quantum theory of cosmology - the *Wheeler-Dewitt equation* (late 60s of the last century). Solutions to this equation define quantum states which are meant to describe the whole universe. However, the solutions are admittedly approximate as the complexity of the universe is reduced to a few variables compared to real factual situations. Moreover the trap of misplacing the observer always lurks behind!

As Lee Smolin put it, " It is very easy to forget one's place and fall for the fantasy that one is outside the universe, having reduced the history of the universe to a game as simple as playing with a yo-yo. What is needed is an interpretation of the states of quantum theory that allows the observer to be part of the quantum system."[18]

Hugh Everett famously advanced a proposal in his 1957 PhD thesis. His relative state interpretation is a prescription to deduce the probability of various answers to the exact questions to be asked about quantum states when the measuring apparatus is presumed to be part of the quantum system. But quantum cosmology needs to abolish the special role of observer which is still not accomplished. There is nothing in the theory to specially categorize the observation we make of the big objects which appear to have definite position and momentum. There is nothing in quantum theory so far, as Smolin observed, "to distinguish the world we experience from an infinite number of other worlds made up of complicated superposition of things in our world."[19]

This is one of the biggest conceptual issues to make further sense - the emergence of 'our' universe of experience out of the infinitely possible other worlds theoretically justified from the point of view of quantum superposition principle. As per Smolin, "Everett's relative state description form of the theory *must therefore be supplemented*(stress mine)by a theory of why what we observe corresponds to the answers to certain question, and not to an infinite number of other questions."[20]

Several people proposed *decoherence* as an answer. A set of questions is called decoherent rules out the possibility of a definite answer to be a superposition of definite answers to others.

We need not get into any further technical details, as we are not discussing cosmology here, but the standard set of two *avyakritas* as they would appear within the framework of modern cosmological parameters.
So, on the basis of what we discussed so far, one thing is clear that the question about structure of the universe as a whole is far from an empirical

issue, and in that sense they are still *avyakrita* ! This is how *Nāgārjuna* and modern cosmological understandings seem to come closer in question of ontologically ambiguous implications of verb 'to be' or problems underlying the meaning of 'is'.

Can logic help anymore to make further sense?

As we have seen that the standard two valued logic is semantically inadequate in context of the whole universe.

What about *catuṣkoṭi* which incorporates the *both* option apart from the standard exclusive Yes or No?

We have seen that, historically *catuṣkoṭi* had served an altogether different purpose to justify *śūnyatā* by discrediting all the four means of cognition as unreliable. But let us take this from other way around, as we have seen the modern understanding - based even separately on quantum mechanics and cosmology, have drafted a new outline of challenge to get beyond the traditional two-valued logic implicit in physics.

What role the 'both' option can possibly play here to cut the *Gordian knot* in this regard, though 'both' is usually thought to be synonymous to *inconsistency* or contradiction?
May be the future progress to understand the structure of the universe as a whole depends on the results to unify quantum theory with gravity according to GTR - our universe may be finite or infinite, or *both* depending on some issues related to the yet overlooked role of *inconsistency* in theory. Universe may be infinite to avoid hosting some internal *inconsistency*, or the *inconsistency* is right there to be taken into serious consideration for further understanding of the structure.

Still we don't know for sure the correct alternative.

We need to make further physical sense of what logically constitutes *both*.

In fact Nature has to be supportive to 'inconsistency' for laying down the unified rules of quantum gravity! General Theory of Relativity (GTR) is well known to rely on mathematical apparatus based on *Riemann geometry* of *space time*, implying, in effect, that, space time '*is* there' independent of observer. This confirms an unambiguous principle *of Individuation* in general relativistic context in the sense of committing implicitly to the notion of unambiguous *'is'* .

But standard quantum mechanics, on the other hand, is well known to have done a permanent *violence* to the *notion of 'is'* !

So, if General Relativity confirms *is*, quantum theory, on the contrary, suggests a straightway *is-ambiguity* (in whatever strange sense ...)! And , if GTR and

standard quantum theory *are both True* , and Nature really operates on the basis of an *yet unknown* coupled mechanism underlying the so called *quantum gravity* , it seems possible to make a better sense of 'this mechanism' on the basis of a logic that *is supportive* to a hostage of both *is and not-is* together . [21]

Paraconsistent logic – a recent field of research based on the distinction between *contradiction* and *triviality*, seems to promise a hostage of both 'is' and 'not-is' together. This is connected with the deep issues of philosophical nature of negation and reality. Paraconsistent logic is an expression that was coined by the Peruvean logician Miró Quesada as an answer to Newton de Costa looking for a good name for the non-standard system he was looking for.[22]

Admittedly there are different systems of Paraconsistent logic based on different techniques. However, relevance of Paraconsistent logic as a basis of quantum gravity is not yet a talked about issue. It is not possible to say at this stage whether this is viable to accept this as a possible variant of quantum gravitational logic or *avyakritas*.

We hold this for another occasion.

Notes and References:

[1] : Concept of *Lokas* or a kind of holistic division of the conceptual whole of our universe from gross to subtle or transcendental happened to be a hallmark of early Indian ways of looking at our "existential" cycle as a whole .This is the basis of *Pindabrahmāndvāda* which is based fundamentally on the accepted possibility to internalize the *Lokas* within the human Body . This kind of holism is quite evident in the early sacred *mantras* as well as in ancient literatures. Theory of *Karma* presupposes the journey of soul through *Lokas*. Though a completely non- empirical issue, the concept of *Karma* and transmigration of soul occupy a significant part of Indian systems of philosophy and religion. This is intrinsically related to other perennial issues like the *free will* and possibility of a *global determinism*.

[2] : One of the most significant aspects to note in this regard is the collective attitude towards Death , immortality and transcendence in ancient India, particularly in the Eastern region where Buddhism and Jainism flourished.
See, for example, Chapter 23 - *Buddhist and Non-Buddhist Mortuary Traditions in Ancient India: Stūpas, Relics, and the Archaeological Landscape* by Julia Shaw,eds . Colin Renfrew, Michael J. Boyd and Iain Morley
From Part VI - Intimations of Immortality: Glimpsing Other Worlds, Published online by Cambridge University Press: 05 November 2015

[3] : E. J. Thomas , History of Buddhist Thought , p. 128

The first alternative can be interpreted as referring to the beginning of the universe and the second is about its spatio- temporal limitation.

[4] : *Digh Nikaye* , 1st Vol , *Majjim Nikaye* , 1st Vol, *Sanjukt Nikaye* , 3rd Volume, *Anguttara Nikaye* , 2nd Volume

[5] : *Abhidharmapitaka* or bucket of higher doctrine is the third of the three divisions of *Tripitaka* . Other two are *Vinaya* and *Sutta pitaka*. Etymologically *Abhi* means higher and *dhamma* refers to the canonical teaching of the Buddha. So *Abhidharma* is about the higher teaching of the Buddha which, the tradition holds, was conceived by the Buddha just after his enlightenment.

[6]: Interpretational variations of *Mādhyamika* is a story it itself which has undergone several stages . It's influence is known to be galvanic, which percolated in time from South India through Tibet and Mongolia to Chiana , Korea and Japan . In India two tendencies developed - one to defend *Nāgārjuna* in logically possible ways. *Bhavaviveka* was the best known spokesman of this school.
Another, who is considered to be most devastating to present *Nāgārjuna* as the destroyer of metaphysics and epistemology was *Chandrakirtī.*
Chandrakirtī is considered to be the most unconventional but true interpreter of the Buddha's transcendental insight. This method was known as *Prāsangikā*.

See Central *Philosophy of Buddhism* by T R V Murti, George Allen and Unwin Ltd., 1955

[7] : *Space and Matter : The concept of ākāsa in Indian Thought*, Rabindranath Tagore Lecture 1999 by Wilhelm Halbfass in Centre for Philosophy and Foundations of Science , Delhi

[8]: In fact the concept of objectivity seems to be *culture–specific* to a large extent. It is interesting to note that it took time till to the end of 17th Century for the terms *subjective* and *objective* to be shaped in their modern meaning. In fact a perfect semantic or linguistic equivalent of the term *objective* is not possible to be traced in Sanskrit or Pāli.

See, *Introduction* by Debajyoti Gangopadhyay in *Nalanda Dialogue Series,* Vol II, , pp., 3-4eds , Debajyoti Gangopadhyay and Vinod Kumar Chaudhary, Navanalanda Mahavihara ,2022

[9]: Interview of Mark Siderits in *Nalanda Dialogue Series*, Vol I, edited by DebajyotiGangopadhyay and Vinod Kumar Chaudhary, Navanalanda Mahavihara, 2022

[10]: In English language the word "vacuum" was first appeared in 1550 in the writing of Thomas Cranmer - the archbishop of Canterbury. His heretical stance regarding *vacuum* led him to face death sentence by burning .In fact, though the renaissance thinkers were gradually moving away from the theological orthodoxy about vacuum, it was far from safe in mediaeval Europe to talk about *physical vacuum* in public.
Toricelli's experiment truly liberated the concept of *vacuum* from the orthodox confine of theological dialectics to the domain of experimental physics.

[11] : For a comprehensive discussion on the mediaeval European debate on vacuum or emptiness, see *Against Emptiness , Descartes's Physics and Metaphysics of Plentitude* by Giancarlo Nonnoi in *Studies in History and Philosophy of Science*, Vol 25 , No. 1, pp. 81- 96 , 1994

[12]: For a comprehensive account of the role of *identity* and *individuation* in Physics, see *Identity in Physics* by Steven French and Décio Krause, Oxford University press, 2006

[13]: *Individuation and Identity in Quantum Mechanics* by Debajyoti Gangopadhyay in *Nalanda Dialogue Series* Vol II, , pp. 81-96, eds , Debajyoti Gangopadhyay and Vinod Kumar Chaudhary, Navanalanda Mahavihara,2022

[14]: *How Physics Would Look Like If Based on the Metaphysical Guidelines ofŚūnyavāda?* Chapter 25 by Debajyoti Gangopadhyay in *Quantum Reality and Theory of Śūnya* , ed. S. R. Bhatt , Springer , 2019

[15], [16]: *The Great Expansion, in The Creation of the Universe*: Viking Press, 1947, pp. 21- 43

[17]: Existence of Gravity waves or *ripples in space* has long been proposed by Einstein more than 100 years back in his General Theory of Relativity .But it was not easy to detect, unless in recent past during 2015 scientists claim to have detected Gravity waves by Laser Interferometer Gravitational-Wave Observatory (LIGO) .
Understandably, apart from light as a source of information from deep space , gravity wave would be another one to provide information about the far away violent phenomena in the universe .

[18, 19,20] : *Three Roads to Quantum Gravity* by Lee Smolin, Basic Books , 2001

[21] : Einstein was famously more welcome to GTR than Quantum theory, and one of the reasons that can be made sense in retrospective that , he could not accept the possibility that *both can be simultaneously true !* And he was ready to disown quantum theory (at least the compelling interpretation pressed upon by Bohr) in favor of GTR.

Einstein's difficulties with *photon ontology* in contrast to 'possible substantiation' of his *favored ontological attitude in GTR* is an interesting episode in modern History of Physics , which led Einstein to think about the famous EPR paper (1935). All because he could not allow *Nature to be inconsistent* to host *both*! Strangely enough, Bohr - though popularly known to have not shared Einstein's ontological attitude, was equally skeptic to any such possibility (" I want to know how Nature avoids contradiction …. " -Bohr)

It is most curious to note that , the *same ontological attitude* about Nature's admittance of contradiction led Einstein to *disbelieve* quantum theory ,and Bohr to defend it through ! A good account of Einstein's struggle with the photon ontology is in *Space time and Separability : Problems of Identity and Individuation in fundamental Physics* by Don Howard , in Boston Studies in the Philosophy of Science (eds.) , Robert S .Cohen , Michael Horne and John Stachel , Vol 194 , Kluwer Academy Publishers,1997.

[22]: There is a reasonably good literature on Paraconsistent Logic. One of the most comprehensive is *Paraconsistency and its Entourage: a Glance Back*, Lecture given by Graham Priest in Brazil, February 22, 2023.

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