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Special Topic: ***In the Beginning was the Word – The Word as a Technical Artefact***

Infinity: Divine Paradigm

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Abstract
"In the Beginning was the Word" provides the biblical reference to the word 'Word,' and 'Infinity' touches upon the traditional philosophical conventions that refer to God as the 'Infinite' and the creations of God as the 'finites.' Infinity as a technical artefact, engages the mind with its abstractness and metaphorical rendition as in Basic Metaphor of Infinity (BMI), but also with its concreteness as in programming, modelling and topography. 'Infinity' as a concept and as a numerical entity refers a quantified element to the qualitative divine – with the intention of comprehending concepts that are generally beyond the cognitive imaginative sphere of the human mind. The formality associated with mathematical proofs authenticates ideas that may seem or are abstract to pinpoint, including the notion that 'nature speaks mathematics' and nature as created by the creator embodies the paradigm of 'Infinity' as divine. Can 'infinity' then be conceptualised as a technical artefact by approaching it secularly with mathematics as the language to comprehend the theological cloud that engulfs it? The answer, perhaps will neither be a simple affirmation or an outright negation.

Keywords: Infinity; Infinite as Concept or Entity; Mathematics; Theology; Cosmology

Аннотация
"В начале было Слово" – отсылка к библейскому "Слову", а "Бесконечность" затрагивает традиционные философские представления, которые называют Бога "Бесконечным", а творения Бога – "конечным". Бесконечность, как технический артефакт, привлекает разум своей абстрактностью и метафорическим представлением, как в базовой метафоре бесконечности (BMI), но также и своей конкретностью, как в программировании, моделировании и топографии. "Бесконечность" как понятие и как числовая сущность связывает количественный элемент с качественным божественным – открывая перед нами возможность понять концепции, которые обычно выходят за пределы когнитивно-образной сферы человеческого разума. Формализация, связанная с математическими доказательствами, подтверждает подлинность идей, которые есть или кажутся абстрактными для точного определения, включая представление о том, что "природа говорит математически", а природа, созданная создателем, воплощает парадигму "бесконечности" как божественной. Можно ли тогда концептуализировать "бесконечность" как технический артефакт, если подойти к ней секулярно, используя математику как язык для понимания охватывающего ее теологического облака? Ответ, возможно, не будет ни простым утверждением, ни прямым отрицанием.

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Infinity: Divine Paradigm

INTRODUCTION

> The Infinite! No other question has ever moved so profoundly the spirit of man; no other idea so fruitfully stimulated his intellect; yet no other concept stands in need of clarification than that of the infinite….
>
> —David Hilbert (as cited in Maor, 1987, p. vii)

The idea of ‘infinity’ has long intrigued the human mind. Since time immemorial the concepts and numerical attributes associated with it have resulted in postulates and paradoxes. It appears to encompass a quantified entity objectively as well as a qualitative concept subjectively. The Universe, looked upon as the creator and the created, metaphorically conjoins the human with the divine at an unbounded cosmological scale that is conceivable only with the notion of ‘infinity’. Can ‘infinity’ then be described?

Let us walk through a few narrative scenarios:

(a) A happily married childless couple is often confronted with the question as to why they have no children. The couple responds that the universe had its way of not blessing them with any. The question that follows is how their relationship survived this crisis. The couple always answers: “The universe is our oyster, and we each other’s. We are blessed with ‘infinity’ and by the ‘infinite’. Just as subtracting one from infinity, leaves infinity or adding one to infinity, results in infinity, our world together remains one - infinite.” The answer is received in awe by some, confusion by others or simple silent skepticism by yet others. The couple’s answer serves to share and celebrate the sense of eternal abundance and completeness that a notion of ‘infinity’ reflects.

(b) A popular story that is often a part of textbooks in India re-enacts the conversation between Alexander the Great and an Indian naked saint on the banks of the river Indus. Alexander was on a mission to conquer the world and had just brought the mighty Persian Empire to its knees, and upon encountering the saint, who seemed to be staring into empty space, enquired as to what the saint was doing. The saint answered that he was experiencing ‘nothingness’ and posed the same question to Alexander. Alexander replied that he was ‘conquering the world.’ Each laughed at the other for the same reason. Alexander could not comprehend the fact that one could waste an entire lifetime doing nothing and the sage could not understand how one could devote a lifetime to conquering an entity without limits. Conquering ‘limitlessness’ versus experiencing ‘nothingness’ perhaps posited a Greek and an Indian worldview confronting each other. To put it in another way, an Abrahamic tradition was facing an Indic philosophy. A belief of ‘one’ life encountering an assertion of ‘infinite’ lifetimes. In biology, cells are the smallest denominator of life. Analogously, if the greatest denominator of life could be determined by the multitude of lives that one believes one lives, then: a) the Abrahamic view of living a single lifetime, emphasizes a linear view of reaching the limit in ‘one’ lifetime; b) the Indic philosophy of infinite lifetimes suggests a circular view of a bounded infinity of limitless birth-rebirth (Pattanaik, 2015).

(c) One enters a hall and finds oneself in between two parallel mirrors facing each other. Mathematically put, the individual witnesses ‘infinite’ virtual self-images, with a

visual perception that the images converge at ‘infinity.’ The images are neither converging nor can one pinpoint infinity.

A short walk through the narrative scenarios confronts us with the idea of infinity, that though perceivable is not comprehensibly definable in a non-mathematical linguistic manner. The concept of infinity, interchangeably used with the notion of the infinite, perhaps aids perception, but evades comprehension. One wonders, if ‘infinity’ as a phenomenon is elusive and evades an ontological grasp since its magnitude is difficult to comprehend and the vastness that it suggests is too surreal to apprehend. Is the abstraction versus the mathematisation of the concept responsible for the abyss between perception and comprehension? One wonders, if it is at all logically explainable that all that is ‘infinite’ is correctly describable by all that one can apply ‘infinity’ to. An infinity of infinites suggests quantification, and therefore, would the measure of such quantification necessarily have to be infinite? The universe debated as being infinite, touches upon the notion of time and space. The unbounded universe is large, unquantifiable and perceivably unmeasurable. Are time and space then infinite? Or are they measurably and thus finitely infinite? History is witness to the geocentric theory that insisted on a spatially finite material universe to accommodate the otherwise inexplicable premise that the stars rotated around the earth in twenty-four hours. Inductively, space then also had to be finite, since it was a structural accommodation for the heavenly bodies. However, the imperceivable and unreachable heaven had to be infinite, since neither the beginning nor the end was known. What was known is that all that was divine was imperishable. A theological take that the divine could neither be created nor be destroyed, derived from the religio-cultural traditions in certain cultures of the world, nestled in the universal scientific affirmation that energy can neither be created, nor be destroyed, but can only be transformed.

It is tempting to relegate ‘infinity’ to the realms of the unknown by ascribing an aura of divinity to the concept in itself. However, it is engaging and enriching to shed some light on ‘infinity’ as an interpretative entity in a state of animated oscillation between human cognition of mathematics and an individual’s belief system. While human cognition of mathematics renders meaning to the interpretative ability of the mind with respect to mathematical symbols and ideas, an individual’s belief system is a congregated projection of the societal interactions and process of identity that an individual conforms to. Intuitively, could such an engagement accommodate the 2-way necessary and sufficient path of interpreting ‘infinity’? That is to say: The human cognition of ‘infinity’ as a mathematical idea leads to the conceptualisation of ‘infinity’ as an entity that finds acceptance by a process of interpretation based on an individual’s beliefs and faiths; Conversely, an individual’s belief system influences the process of cognition of ‘infinity’ as a mathematical idea. Perhaps, a dynamic ‘to and fro’ equilibrium between the two paths (i) Cognition-Interpretation-Belief and (ii) Belief-Interpretation-Cognition could be the key to understanding the perception of ‘infinity’.

Lakoff and Núñez (2000) explain that human ideas based on cognition are not simple to explain, since they are predominantly based and grounded in “*sensory*-motor experience” and the abstract ideas that individuals put forth “make use of precisely formulatable cognitive mechanisms such as conceptual metaphors that import modes of reasoning from *sensory*-motor experience. It is *always* an empirical question just what human ideas are like, mathematical or not” (p. 2).

PERCEIVING INFINITY

How does one look at ‘infinity’? Is ‘infinity’ a thing? Is ‘infinity’ an endless process? Is ‘infinity’ a mere mathematical symbol? Is ‘infinity’ a limitless entity or is ‘infinity’ the limit of the unbounded? The dilemma of comprehending ‘infinity’ and nailing it with a definition arises primarily because one does not encounter ‘infinity’ as an entity or a process in the real world and an individual’s sphere of conception and conceptual systems are finite and thereby the mechanisms to perceive ‘infinity’. As Núñez asks, “How can human beings understand the idea of actual infinity - infinity conceptualized as a thing, not merely as an unending process? What is the concept of actual infinity in its mathematical manifestations - points at infinity, infinite sets, infinite decimals, infinite intersections, transfinite numbers, infinitesimals?” (Lakoff & Núñez, 2000, p. xii). He reasons “since we do not encounter actual infinity directly in the world, since our conceptual systems are finite, and since we have no cognitive system to perceive infinity, there is a good possibility that metaphorical thought may be necessary for human beings to conceptualize infinity” (Lakoff & Núñez, 2000, p. xii).

Taking a step sideways, let us attempt to analyze the perception and understanding of ‘infinity’ when it is grasped as being synonymous with ‘divinity.’ Oppy’s (2006) premise that God is ‘infinity’ and therefore ‘The Infinite’ is comprehensible without abstraction or mathematization, when God is accepted as an entity that is beyond any definition or quantification. Hence, the unfathomable becomes fathomable. When the term ‘infinity’ resonates irreplaceably with ‘God,’ its comprehensibility is no longer associated with perceptibility. It is then an acceptance. However, ‘infinity’, when engaged with as a technical term becomes measurable. A concept of ‘infinity’ detached from divinity becomes conceivable. The notion of ‘actual infinity’, wherein ‘infinity’ is a technical element, can be discussed as a realizable entity. ‘Actual infinity’ is then distinguishable from ‘transcendental infinity’, wherein infinity is beyond human cognition and knowledge. Perceiving and thereby conceptualising ‘infinity’ as a cognitive activity of defining or theorizing is problematic, since such a process is an inductive thought process. In the case of ‘infinity’ there is then an absence of an *a priori*, and therefore, a discontinuity in the process of induction.

INFINITY THROUGH LENSES

The discussion up to this point been an oscillating one, with references to infinity in the realm of the divine and as it is in the technical one. Are we then dealing with a multitude of properties of infinity, depending on what lens it is being viewed through? The interdisciplinarity of the concept of infinity becomes apparent from its rendition in the history of mathematics, philosophy, science, arts and theology is proof enough that it has preoccupied formal and informal interactions with humankind. Fictions of infinity in literature as well as the narratives of infinity in the scientific world have had to deal with the difficulty of defining ‘infinity.’ Why indeed is it so? Is it the nature of infinity that it eludes definition or is infinity as a concept itself infinite and therefore beyond definition? Riedelsheimer (2020) enumerates two properties of infinity that appear as an “aesthetic feature in literature and of what impact such fictions of infinity may have on readers.” The properties he enumerates are “(1) The infinite is beset by paradox and resists, or at least challenges human understanding. (2) As a result, infinity likewise resists its own

representation, at least where the representation is anything else but highly abstract" (p. 3). He further opines that an attempt at defining the infinite is a difficult endeavour by quoting Wolfgang Schoberth's observation that a definition is a demarcation and the consequence of this demarcation is that a boundary is imposed on the concept that is being defined. Therefore, "a definition of infinite, deprives it of infinity (the first and in many ways central of plenty of paradoxes of the infinite), or, conversely, the definite is also finite." He elaborates his present view that "there is no metalevel at which infinity may be safely contained" by qualifying it with Waldenfels' 'basic aporia' of infinity, i.e., "How is it possible to think infinity without rendering it finite? Rather, infinity is fundamentally at odds with our - necessarily finite - *experience* of infinity, resulting in an antagonism between what we experience (the infinite) and how we experience it" (Riedelsheimer, 2020, p. 4).

The mathematician Rudy Rucker (2007) touches upon the history of infinity and explains that the appropriateness of the symbol ∞ lies in the fact that it is seen as allowing one an endless travel around a curve and that "Endlessness is, after all, a principal component of one's concept of infinity." Interestingly, he goes on to suggest that other notions which are associated with infinity, namely indefiniteness and inconceivability, have had negative connotations. Due to these negative connotations, according to him, infinity "inspires feelings of awe, futility and fear. Who as a child did not lie in bed filled with a slow mounting terror while sinking into the idea of a universe that goes on and on, for ever and ever?" (p. 2). Rucker (2007) refers to the history of foundations of mathematics and suggests that the mathematical universe has progressively expanded to include a multitude of infinities, for boundaries, limits, quantities, numbers, etc. Vedic mathematics of India refers to '*ananta'* which is the Sanskrit word for infinity and which literally translates as 'the one without any end.' It captures the essence of all that is unlimited. Unlimited, here, does not exhaustively pertain to the infinitely large but also to the *infinitesimal*. '*Purnam'* - another Sanskrit word that means whole and complete, refers to a notion of infinity wherein the completeness is an attribute to the creator of the universe. The symbol of '*ananta*' as visualised in the Indic worldview reflects the lemniscate that draws its origin from the mythological depiction of the Hindu God Visnu lying on the coiled serpent *Adi Ananta Sesha*, floating on an ocean of milk and supporting the earth upon an extension from his navel. *Adi* - the primal, *Ananta* - infinity, and *Sesha* - the limitless symbolises the triad one-infinity-zero, the circular representation of life and the infinite life cycles (Pattanaik, 2015).

The Greek word for infinity that has been more popular in usage is *apeiron*, its literal translation 'unbounded.' It is often interchangeable used to mean infinite, indefinite, undefined, etc. Rucker (2007) explains that for the ancient Greeks, *apeiron* was the original chaos out of which the world was created. Although the idea of divine creation in the Indic, Greek and Abrahamic traditions similarly involves the terms of infinity, nothingness and orderliness, the point of differentiation lies in the way the terms are interpreted. The Indic view is based on a cyclic birth-rebirth phenomenon wherein nothingness precedes the beginning, which in turn gives rise to the limitless. The infinity circle is bounded but limitless. The Greek worldview is one where the starting point of the world was chaos until God brought in order. The Abrahamic view, that talks of the world being created out of nothingness and emphasises a single lifetime of existence, suggests a bounded linearity of life.

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INFINITY - PHILOSOPHY AND MATHEMATICS

In order not to get entrapped into a debate surrounding the religious interpretations of infinity, let us take the unifying intersecting point that in major religious traditions, acceptance of infinity is derived from its synonymity with a divine supreme God. However, the transformation of infinity comes with the mathematized linguistic real world in which the concept of infinity and thereby of the infinite took on a technical character, e.g., with Aristotle distinguishing between 'potential' and 'actual' infinity.

Mathematics, as a subject, seems to accommodate infinity graciously. In contrast, since a linguistic ascription in literature to the same effect is lacking, the concept of infinity is looked upon as transcendental and a representation in language seems problematic to pinpoint. Riedelsheimer (2020) opines that though there is an infinity of numbers in mathematics, with the largest countable number being non-existent, one runs out of names before running out of numbers. Yet, many mathematician-philosophers or, rather, philosopher-mathematicians, have a powerful tendency to let nature speak mathematics. Often quoted is Blaise Pascal's thought that relates to the disproportion of humans when compared to nature and the universe. Nature according to Pascal (1670/1910) is "an infinite sphere, the centre of which is everywhere, the circumference nowhere. In short it is the greatest sensible mark of the almighty power of God, that imagination loses itself in that thought" (p. 26). If humans could let their imagination soar and were to evaluate their position as against infinite nature, what would their stature be? Pascal opines that humans are nothing when compared to nature, that they are an all when compared to nothing, thus rendering human existence as a mean between nothing and everything. The thought, though attributed to the Christian belief that Pascal dedicatedly conformed to, seems to take a cue from the origins of Hinduism, which emphasises the whole philosophy of life to be an infinite eternal circle of nothingness and infinity.

Irrespective of the history of the traditional religious beliefs, one can clearly witness the similarity across cultures when relating humanity to infinity and divinity. Pascal's obvious reference is to God, when he talks of the 'Author' understanding the marvellous processes transcending the bounds between nothingness and infinity. Humankind's inability to comprehend that it is was created from nothing and shall be swallowed up into infinity renders the individuals in a state of suspended animation, once the realisation dawns upon them that one is in the middle of a process, trying to either grasp its beginning or its end. Nature in all its grandeur, although looked upon by humans as a collection of material objects, cannot, according to Pascal, be perceived or imagined as divisible beyond a limit, although nature is infinitely divisible. The notion and belief that nature is infinitely divisible has often been associated with the infinitely small or the infinitesimal. The concept of the infinitesimal - an essential element in Hindu and Indic philosophy of science and mathematics and often seen as the precursor to the modern theory of calculus - forms an essential cornerstone in the history of world mathematics. The perception of infinity as the unattainable large is thought to be imaginable when associated with the greatness of God. However, the infinitesimal or the infinitely small is perceptibly less obvious. Pascal opines that an infinite capacity is required for both and the capacity to attain the nothing is no less demanding than attaining the all. These extremes according to him do "meet and reunite by force of distance, and find each other in God, and in God alone." Pascal's thoughts open up the idea that in being the infinite, God is 'everything' and in the 'smallness' of man as being a part of infinitely divisible nature, the human

being is ‘something.’ The smallness of humans conceals the infinite and perhaps that is the reason why humans believe in their capabilities to reach the converging centre rather than the expanding circumference of the world around them. Pascal’s contention that it is in God that the extremes are contained and that the human being is nothing but a material object in between these extremes, leads to the view that everything that is not infinite is always distant from the extremes that are comprehended as being infinity, and these then are the finites which in comparison to the infinite, are equal.

INFINITY IN HISTORY

Taking a step back in history, there is Aristotle (ca. 350 B.C.E./1930) who is critically engaging Zeno’s paradoxes that were formulated upon infinite divisibility. In response he put forth the idea of ‘types of infinity,’ thereby introducing and distinguishing between potential and actual infinity. Actual infinity is popularly referred to as the complete or completed infinity (Maor, 1987). This distinction, put forth by Aristotle seemed to mitigate the negative connotation that the ancient Greeks traditionally associated with infinity as the chaotic and the unintelligible. The distinction lent a technical sense to the word ‘infinity’ which was until then a conception of abstractness and incomprehensibility, until and unless synonymised with the epitome of the unfathomable - the divine.

The notion of actual infinity was perhaps the first time that ‘infinity’ was seen as a whole completed entity in the real world. It reflected a sense of accuracy and definability that could aid in viewing infinity objectively and effectively, that is, in the modern world the basis of modelling of what can be viewed as the finite. What does one then associate with the notions of potential and actual infinity? Let us revert to the classical Zeno’s paradoxes to shed some light on the potentiality and the actuality of infinity. Zeno’s Achilles paradox suggests that a runner can never reach the finish in a race, since in order to do so, one has to first to reach the halfway mark. Once the mark is reached, the next halfway of the remaining half distance must be reached. Proceeding with this line of argument, the runner is caught in an infinity of half-ways and even though the end point seems to be approachable, it is supposedly not reachable. The potential infinity is then a process that is taken as a never-ending process over an unbounded timeline, but viewed within a specified time span, is finite. Absolute or completed infinity on the other hand is not a factor of a time process, but rather, it is an existential whole existing at any given time. The grasping of the difference between the potential and the actual has been problematic and intriguing even in the field of mathematics during the medieval and renaissance era. The potentiality characterised by the never-ending was readily accepted as opposed to the idea of the actual that seemed too abstract to be viewed as realisable. Let us consider the popular mathematical infinite sequence of polygons with n sides, obviously starting with n=3: triangle, square, pentagon, hexagon, and so on. As n tends to infinity the resulting figure that the sequence is potentially leading to is no visually perceivable polygon whatsoever: The visually perceived figure is that of a circle - without distinguishable sides. However, as n tends to infinity and the lengths of the sides decrease infinitely with the distance from the centre to the vertices remaining constant, say r, the resultant perimeter of the figure closes on to $2\pi r$, which is a resultant figure of a circle. The circle is then a regular polygon with an infinite number of sides denoted by n. The

idea of the actual infinity in mathematics is what makes propositions perceptible and imaginable. One must also refer to what mathematicians call the "worst evils" (Núñez, 2005), wherein absolute infinity assumes a very controversial role, say, in the case of equations. A constant a divided by 0 is equal to infinity: $\frac{a}{0} = \infty$. This of course is based on the idea that as the denominator in a fraction tends to an infinitesimally small quantity, the resultant fraction tends to an indefinitely large number. The problematic is that, the acceptance of the resultant of an equation where the denominator is zero to be infinity, automatically implies that the multiplication of infinity with zero results in a constant, say a. These absurdities resulted in many mathematicians rejecting the idea of absolute infinity. Notwithstanding the controversies and subsequent rejection of the idea by a certain segment of the mathematical fraternity, the mathematician Georg Cantor (1932), drawing upon the work of Bernard Bolzano (1851) and Richard Dedikind (1901), thematized the idea of absolute infinity in one of the path-breaking works in mathematics which saw the birth and development of transfinite numbers. As Núñez (2005) explains

> "[…] The 19th century was a very productive period in the history of mathematics, one that saw fundamental developments such as non-Euclidean geometries, and the so-called arithmetization of analysis. The latter, a program led by Karl Weierstrass, Richard Dedikind, and others intended to ban geometrical and dynamic intuitions (thought to be the source of paradoxes) by reducing the whole field of calculus developed in the 17th century by Newton and Leibniz, into realms of numbers. Counting and focussing on discrete entities, like numbers became essential. It is in this *zeitgeist* that Georg Cantor, originally interested in the study of trigonometric series and discontinuous functions, was brought into his development of transfinite numbers, dispelling the well-established views that abolish the use of actual infinities in mathematics. Today, Cantor is best known for the creation of a mathematical system where numbers of infinite magnitude define very precise hierarchies of infinities with a precise arithmetic, giving mathematical idea of some infinities being greater than others." (p. 1723)

CANTOR- INFINITY AND THE TRANSFINITES

Cantor's ideas and theories were always a subject of controversies, perhaps owing to the fact that his concepts and propositions challenged the established structures, while the unknown and unimaginable infinity was being given a structure. Interestingly, the mathematical theory of Cantor had its origin and basis in his deeply devout Lutheran beliefs. Bruce A. Hedman (2019) attributed his decision to study philosophy and mathematics to being ordained by God. In theorizing transfinities Cantor was of the firm belief that they had been revealed to him by God and was convinced of his function to spread the word of God's creation for the benefit of the church and the world. Apparently, his firm belief in following the revelation of God was what saw him through the phase of rejection by the established mathematical communities and structures of the times. Kronecker, Cantor's former professor in Berlin and an early proponent of constructionism, completely rejected Cantor's approach and, according to Hedman, regarded Cantor as a "corrupter of youth." With his suggestion of transfinites Cantor was offered no support from his colleagues in philosophy, who were either materialist,

determinist, or positivist. Cantor insisted that the universe was neither eternal nor unbounded and that this was amply emphasised by the transfinites. What exactly are the transfinites that Cantor put forth and that projected infinity as a realisable and completed entity? Until Cantor's theorization of numbers, infinity was in the numerical sense taken to be a number larger than all others, and since each number can be succeeded by another number, there could be no such entity as the largest number. Infinity continued to be associated with the very large as well as the very small. The well-established views promoted by the mathematicians of those times were not only against the concept of 'actual infinity,' but also opposed to the use of 'infinity' as an ordinary number that followed simple arithmetic rules. Cantor, while insisting on the existence of actual infinity as a mathematical being, supported his theory further by stating that an infinite set must be regarded in totality, that is, as an object which the human mind perceives as a whole. He justified his claims by emphasising that the denial of an actual infinite effectively denies the existence of irrationals in number theory. Strengthening his theory, he further elaborated the existence of many classes of infinity and not just one infinity. This then suggested that there were not only hierarchies of infinites, but also infinities that were greater than others. Cantor's theory is based on the simple 1:1 correspondence in set theory, exhaustively explaining that an infinite set, could be matched 1 to 1 with a subset of itself. As an example, the set of natural numbers being infinite can be matched 1:1 to the set of squares of each of the natural numbers, which is itself a subset of the set of natural numbers: If Set A is [1,2,3, 4….] and set B is [1,4,9,16….], there exists a 1:1 correspondence between the two infinite sets, despite set B being a subset of A. The insistence on the uncountable being countable was a direct challenge to extant theories which conformed to the idea that the whole is greater than its parts. Though the view was met with scepticism, Cantor in effect demystified the vagueness surrounding an infinite set by highlighting the most fundamental property of an infinite set, namely that it could be matched 1:1 to a proper subset of itself. This was possible because a set of elements could be arranged irrespective of the magnitude of the elements. With this rearrangement the 1:1 correspondence could be elucidated and an infinite set could be shown to correspond to a set of 'counting numbers' and hence to be denumerable. Another significant part of Cantor's thesis was that all infinite sets could not be denumerable, because there are sets that correspond to the real number line, and the points constituting the real number line are infinite and any segment of this infinite real line was also infinite and hence, denumerable. This form of infinity of the infinites was termed by Cantor as the infinity of the continuum.

Though Cantor was faced with significant opposition from his colleagues, philosophers and mathematicians, it is interesting, as Hedman (2019) points out, that Cantor first received support from Roman Catholic scholars. He explains that this support was conditional, however. Cantor's argument was supported by his reference to Augustin's *City of God* as quoted by Hedman: "All infinity is in some ineffable way made finite to God, for it is comprehended by his knowledge" (p. 170). Cantor's mathematical concept of a 'completed set' was a completed infinite *Ding für sich.* Cantor had advanced it with the set of natural numbers which he designated as a set in themselves and defined that set as the first transfinite number. Hedman (2019) clarifies that Cantor referred to Plato as providing an intellectual precedent for this step: "All things that are even said to be consist of a one and many, and have in their nature a conjunction of limit and

unlimitedness" (p. 170). Though critical of Cantor's belief in the actual infinity of the created order, the Roman catholic scholar Fr. Constantin Gutberlet was satisfied that Cantor's set of infinite magnitude was consistent with God's unique infinity. Though Cantor insisted that the universe was infinite neither in duration, nor in existence, he did conceptualise an infinite number of elementary particles - monads as Hedman explains, in order to justify that the transfinites existed in the physical universe. To promote acceptance of his theory, Cantor in a letter to Cardinal Johannes Franzelin (Gutberlet's teacher) clarified the distinction between absolute infinity and the *Transfinitum* (transfinites) by stating that the absolute was the "eternal and uncreated, reserved for God and his attributes, and the Transfinitum as created in the physical universe and in the mind of man." An endorsement from the cardinal, that suggested that there was "no danger to religious truth" in Cantor's concept of the *Transfinitum* facilitated acceptance of the mathematical theory from religious quarters. Cantor's theory not only revolutionized the field of science and mathematics, it also provides a new perspective to philosophers and theologists to address the idea and notion of infinity as an entity, viewed objectively but not in conflict with the divine.

As a thought corollary, one could ask, if Cantor's theory would have found immediate acceptance, if it had sought the endorsement of theologists with a Hindu or Indic worldview. The answer probably would be in the affirmative. From the Hindu point of view God is infinity and the creations of God derived from God are complete wholes and therefore infinities in themselves. This suggestion that the creations of God, despite being the subsets of God, are infinite themselves, does not take away the supremacy of God, but rather emphasises the hierarchy of the infinite and therefore infinity.

PINPOINTING INFINITY

Cognitively, theologically or perceptibly, the concept of 'infinity' is seen as one that cannot conform to a notion of bounded embodiment. Given that our experiences are bounded, and therefore finite, a notion of 'infinity' simply as a negation of the finite will be a reductionist view of trivialising 'infinity' to a symbol or a word describing the lemniscate. The Basic Metaphor of Infinity (BMI) as proposed by Lakoff and Núñez (2000), engages with 'infinity' as an entity to which a cognitive metaphor may be assigned. Núñez (2005), commenting on Cantor's transfinite cardinals, explains that the creativity displayed in Cantor's work by way of his counterintuitive and paradoxical results, go a long way towards understanding the ability of "human abstraction through conflicting conceptual structures." He opines that "contrary to many mathematicians' and philosophers of mathematics' beliefs, the nature of potential and actual infinity can be understood not in terms of transcendental (or Platonic) truths, or in terms of formal logic, but in terms of manipulation of meaningless symbols in human *ideas*, and *human cognitive mechanisms*" (Núñez, 2005, p. 1738). To be able to relate to the idea of 'infinity', as a conception of the human mind, Lakoff and Núñez (2000) suggest that one must delve into what linguists call the "*aspectual system"* - one in which the individual structures events as they are conceptualised. In the real world, processes that are called 'infinite' are those that continue endlessly without a limiting point, and this is what they call *"the literal concept of infinity."* The idea of an iterated action that may be characterised by the metaphor "Indefinite Continuous Processes" may then be attributed

to the idea of mathematical 'actual infinity' as a metaphor. The metaphor then addresses an unending process as a series of infinitely "iterating step-by-step processes," and these steps are countably finite but infinitely finite processes, therefore approaching the limitless infinity. The obvious take of the metaphorical reference is to the concept of infinity as reflected in Zeno's paradoxes. Lakoff and Núñez's BMI allows for a cognitive conceptualisation of 'potential infinity' and distinguishes it from the notion of 'actual infinity.' This lends the status of entity to 'infinity,' offering a possible cognitive explanation of the nature of 'infinity.' They argue that BMI in conjunction with other mechanisms of cognition offers the opportunity to appreciate transfinite cardinals and pinpoint infinity as an entity in order to see that "the portrait of infinity has a human face" (Lakoff and Núñez, 2000, p. 9).

CONCLUSION

Infinity, as a mathematical entity, assumes the conceptual precision that is universally characteristic of the language of mathematics. The technical usage of 'infinity,' though distinct from its comprehensibility as a concept, is deeply rooted in the cognitive association of 'infinity' as synonymous with God, the supreme divinity. The essay, has been an attempt to analyse 'infinity' qualitatively and quantitatively, in order to catch its secular reflection in a theological mirror. 'Infinity' resists ontological grasp, while on the one hand it finds easy acceptance as a metaphor, linguistic artefact, and as the 'word' that symbolizes the infinite divine; while on the other hand, as a technical mathematical artefact, it is used as a tool to scientifically conceptualize the abstract.

Joseph Bracken's suggestion of "generalized structures of intelligibility" (Bracken, 1995, p. 2) to address the metaphysical perception of infinity, can perhaps be seen as a harmonizing or balancing view of 'infinity.' He views 'infinity' not just as an entity, but as an activity. He reasons that an understanding of the infinite has to be both qualitative and quantitative. He is thoughtful when he suggests that all inter-religious dialogues refer to the relationship between the finite and the infinite in one way or another. He deliberates whether the infinite should be "[…] conceived in entitative terms as the sole enduring reality" - or "[…] regarded as a principle of existence and activity which is actual only in its instantiations or manifestations?" Bracken contemplates whether there is indeed a way to "understand in some measure the reality of the Infinite or is one necessarily reduced to silence before what transcends human imagination and/or conception?" (Bracken, 1995, p. 139-140). Perhaps, a reflective, albeit inexhaustive response to these questions could be Bracken's (1995) words:

> "[…] My own understanding of the Infinite as an all-encompassing 'matrix' or 'energy-field' for the divine persons and all their creatures is only one possible response to these questions. But, insofar as it offers at least a somewhat plausible explanation to these vexing philosophical questions, it may encourage others out of their own religious traditions to offer alternative solutions." (p. 140)

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The essence of 'Infinity' in a verse:

ॐ पूर्णमदः पूर्णमिदं पूर्णात्पूर्णमुदच्यते ।
पूर्णस्य पूर्णमादाय पूर्णमेवावशिष्यते ॥
ॐ शान्तिः शान्तिः शान्तिः ॥- (Sivananda, 2017, 1.3.28)

Om Purnam adah purnam idam purnat purnam udachyate|
Purnasya purnam aadaya purnam evavashishyate||
Om Shantih shantih shantih (Phonetical version of the Mantra in Sanskrit, by C.C)

The verse is Sanskrit, taken from the Yajurveda. It can be translated and is indeed translated in a multitude of ways depending on how one translates or interprets the word '*purnam.*' However, the essence of the meaning remains the same, since '*purnam*' means infinite, complete, eternal, unity, full, total. The verse means that the 'divine' is infinite, and what comes out of the infinite is infinite, and upon taking the infinite from the infinite, what is left is the infinite.

REFERENCES

Aristotle. (1930). *Physics. Book VI.* (R. P. Hardie and R. K. Gaye, Trans.). The Internet Classics Archive. http://classics.mit.edu/Aristotle/physics.6.vi.html (Original work published 350 B.C.E)

Bolzano, B. (1851). *Paradoxien des Unendlichen* [Paradoxes of the Infinite]. C.H. Reclam.

Bracken, J.A. (1995). *The divine matrix: creativity as a link between East and West*. Maryknoll.

Cantor, G. (1932). *Gesammelte Abhandlungen mathematischen und philosophischen inhalts.* [Collected treatises of mathematical and philosophical content] (E. Zermelo, Ed.). Springer.

Dedekind, R. (1901). *Essays on the Theory of Numbers* (W. W. Beman, Trans.). The Open Court Publishing Company. https://www.gutenberg.org/files/21016/21016-pdf.pdf

Hedman, B. A. (2019). Cantor and the Infinity of God. In B.P. Göcke, and C. Tapp (Eds.), *The Infinity of God: New Perspectives in Theology and Philosophy* (pp. 167-183). University of Notre Dame Press.

Lakoff, G., & Núñez, R.E. (2000). *Where Mathematics Comes From- How the Embodied Mind Brings Mathematics into Being.* Basic Books.

Maor, E. (1987). *To Infinity and Beyond: A Cultural History of the Infinite*. Birkhäuser.

Núñez, R. E. (2005). Creating mathematical infinities: Metaphor, blending, and the beauty of transfinite cardinals. *Journal of Pragmatics, 37*, 1717-1741.

Oppy, G. (2006). *Arguing about Gods.* Cambridge University Press. https://doi.org/10.1017/CBO9780511498978

Pascal, B. (1910). *Thoughts. Letters. Minor Works*. (W.F. Trotter, M.L. Booth, & O.W. Wight, Trans.). P.F. Collier and Son Company. (Original work published 1670)

Pattanaik, D. (2015). *Gods of Zero and Infinity*. Ministry of External Affairs, Government of India.
Riedelsheimer, M. (2020). *Fictions of Infinity*. Walter de Gruyter.
Rucker, R. (2007). *Infinity and the Mind*. Princeton University.
Sivananda, S. (2017). *The Brihadaranyaka Upanishad: Sanskrit text, English translation, and commentary*. Divine Life Society.