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Continuum Hypothesis Higher Infinity and Human Consciousness

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Abstract

When Centor proved that all infinities not equal completely New Era in logic and in mathematics opened. It is proved that there are more real numbers than natural numbers and there cannot be a maximum set in mathematics. If we take the power set of a given set then it always contains more members than the set itself. In this way there is no and infinities. There cannot be a collection which can be called the highest or maximum collection. This is also a limit of human reasoning because it appears in the form that if it is believed that the continuum hypothesis is true then it also works. And if we believe that the continuum hypothesis is false then it also works. Actually, Godel and Cohen proved that both continuum hypothesis and its negation can be proved as independent from the rest of the axioms of set theory. Since 1963 this is an unsolved problem in mathematical logic. Very recently the famous mathematical logician hugh woodin proved a result in which there is a particular type of model in which the continuum hypothesis is false. In our Upnishada Anant is called the Swarooplakshan of Brahma. If Anant is to be taken seriously when merely on the ground of intellect infinity cannot be grasped. We have repeatedly observed in Upnishada that true infinity can be obtained only in the state of liberation and mathematical infinity is not true infinity which can be assigned to ultimate reality or Brahma. There is a future scope of research in this direction where particularly from Taitiriya Upnishad where Satya, Gyan and Anant are stated as Swarooplakshan of Brahma. This new science of consciousness can be developed. Only Brahma

is infinite in the absolute sense of the term and all other infinities which occur in logic and mathematics are relative infinities and so they cannot be the characteristic of reality.

Keywords: Continuum hypothesis, Higher infinity, Human consciousness, Axioms system, Higher Order Logic, Artificial intelligence

The concept of infinity plays an important role in logic, mathematics and philosophy. The most important result about infinities is that all infinities are not equal. If a set is infinite then its power set is also infinite but that will be a greater infinite. Let us explain this matter with some technically.

Suppose M is a set which is infinite and it is countably infinite. This means that it can be put in one relationship with the set of natural numbers. The power set of this set M which is P(M) is greater than it. Cantor proved the theorem that $M \leq P(M)$[1] that is $M=N_0$ and N_1 both N_0 and N_1 are infinite But $N_1 > N_0$ now the question is this is there any other infinite number which is between this and an infinite number if we are giving the answer to this question in negative this is called continuum hypothesis. So the continuum hypothesis says that in the scale of infinity there is no infinite number which falls between two infinities. That statement is called the generalized continuum hypothesis or GCH in shot. No one knows whether this continuum hypothesis is true or false, but as logic generally indicates, it must be either true or false. Very strange situation arises when it appears that this CH ~CH both can work to let us understand it without going into much mathematical technicality.

Axiomatic set theory and continuum hypothesis

When Cantor presented his set theory, many paradoxes were put before it. Among them the famous paradox is Russell's paradox which states that set formation cannot be made categorically and unlimitedly Paradox can be stated as: consider the set of all sets which are not members of themselves. Call this set S. Now if we ask the question whether S is member of itself or not we find the paradox in the form: S is a member of itself if and only if S is a not a member of itself or $S \in S \equiv S \notin S$ for the solution of this paradoxes the axiomatization of set theory was attempted. There were many axiomatization among which the most successful and useful axiomatization had been made by Zermelo and Frankel.[2] This theory is called Zermelo-Frankel set theory or ZFset theory. As an axiom system it has axioms. And these axioms are to be independent from each other, that is a particular axiom is independent if it cannot be derived as a theorem from the rest of the axiom. When we take the case of CH in this reference CH can we prove it as independent from other axiom of set theory? So it can be taken as an extra axiom of set theory but more surprising phenomenon is this that ~CH can also be taken as extra axiom.

But this is a very strange situation because if any system a proposition and its negation both are axioms then the system is inconsistent. This means that in this type of system every preposition can be proved. Letters explain this matter with more details.

Suppose we are adding CH and ~CH both in the list of the axioms in the list of ZF axioms.[3] In this system we are accepting the rule of inference as the rule of addition and the role of disjunctive syllogism. If in this type of system any preposition is to be proved it can be proved only after two steps. Suppose that propose is Q and suppose CH and ~CH are either in the list of postulates or they are accepted as extra premises. Then the desired preposition Q can we added in CH and by the application of the rule of disjunctive syllogism it can be derived. But at the same time by the same procedure and by the same step negation of the preposition of Q can also be derived and this is a clear cut inconsistency and in this way the whole of mathematics becomes inconsistent. This is a fundamental limitation which come before any universal applicability of the theory of strong, artificial intelligence. Another challenge which comes before this concept is from Godel's famous incompleteness theorems.

Godel's incompleteness theorems and AI

When any formal system is constructed two type of completeness are required. The first one is analytic completeness in which it is proved as a metatheorem; it is proved that only the truth of the given system can be proved in that system. Another type of completeness is deductive completeness. In deductive completeness it is to be proved that all definable truths can be proved as theorems in that system. For example the systems constructed for propositional logic are generally both consistent and complete. The system constructed for first order predicate logic in which only individual variables are to be quantified can also be proved as consistent and complete. This very result is also proved by Godel himself in 1930 and is known as Godel's completeness theorem. But when we go to second order predicate logic them if the system which is constructed for second order predicate logic is inconsistent then everything can be proved but if it is consistent then all true propositions cannot be proved. So if this type of system are consistent then they are deductively incomplete now we have to think that why this happens and what it has to do with the concept of infinity and particularly with higher infinity. It is explained as follows.

The truth which can be presented and constructed in the systems of propositional logic and first order predicate logic are countably infinite but the system for second and higher ordered predicate logic content contains truth which are uncountablely infinite now in mathematical logic it is proved that in any system the truths which are proved can only be countablely infinite truths. So for second order predicate logic the all prepositions which are true are uncountablely infinite and those prepositions which can be proved are countablely infinite only. In simple words this means that in any system which is constructed for second order logic or higher order logic almost all truths are unprenewable. This is presented in Godel's famous incompleteness theorem which can be formaly stated as follows. If a number theoretic formal system is consistent than AP(P) is

not a theorem and if it is w - consistent than ~AP(P) is not a theorem. So if system is consistent then it is simply incomplete with the example of AP(P) as an undesitable formula.[4]

This is a technical version of Godel's incompleteness theorem. Here we are going to think conceptually that whether there is something in the proof of Godel's theorem which can be understood by a human being and at the same time it is impossible for computer or any artificially created machine and if our answer is in affirmative than what are the causes and implications behind it. We are going to examine the matter in detail with historical reference.

This type of paradoxical situation arises when any proposition refers to itself and we demand semantic interpretation of that preposition in the given contacts. Actually in ancient Greek philosophy this paradox was famous as a liar's paradox. Suppose a person makes a statement that I am lying. Now the very preposition I am lying is true or false? And here there is a paradox. If that person is not lying then whatever he saying is not true and therefore he is speaking a false statement and if he is lying then he is lying and still and the claim of that preposition is true. Therefore the proposition is true only in the case if it is false. Now the paradox can be stated in the following way. If this proposition is L than the truth condition of L can be stated is,

L is true if and only if ~L

This paradox was known in Greek philosophy and subsequent western philosophy also. But generally much attention was not given on the problem which is hinted by this situation. Generally it was taken as an example of a polemic sophistry but in 19th century with the arrival of set theory and certain other development in mathematics and mathematical logic made it clear that there are different types of infinity and the process of self-reference somehow is related with the concept of the scale of infinity. Particularly in the field of pure mathematics this became clear when cantor prove that the set of all real numbers is uncountable. The proof of cantor which uses the diagonal method also refers the process of self-reference because the decimal which is constructed by the cantor from the infinite matrix is nothing but an example of self-reference containing expression. The same situation applies to Godel's incompleteness theorem. The very preposition AP(P) which is the constructed in Godel's incompleteness theorem is constructed by the application of Cantor’s diagonal method. Whenever this diagonal method is used it always refers to a stage of higher infinity and therefore in Godel's incompleteness theorem the undesirable formula appear simply because in second order logic we are permitted to quantify predicate variables also and therefore infinity which they refer is higher type of infinity. Otherwise a system for propositional logic and first order predicate logic this type of situation does not arise and so all the expressions which can be constructed in such a system are simply countably infinite.

Human mind can grasp this and evaluate this also but there are observations that assessment and evaluation of Godel's incompleteness theorems or the problem of continuum hypothesis is not possible by any machine computer or artificially created intelligence. Why this is so this we are going to show in our last section of this paper.

Higher infinity human consciousness and AI

Here we are not directly concern with the ontological concept and definition of human consciousness or consciousness but we want to make it clear that here we mean by consciousness something more than biological replication of a particular type of chemical like DNA or RNA. No doubt this human consciousness at least on earth appeared and manifested in the process of biological evolution. Yet it contains something more than the biochemical structure of general chemistry and biology. We also make it clear that we are making no essential difference between human consciousness and other forms of consciousness with all the examples of other forms of living creatures on this planet. With this primary exposition now we turn to the main point that how does human consciousness differ from artificial intelligence in this particular reference?

It is a well-known fact that for the function of a computer or any such type of system a certain type of algorithm is necessary. Now how does the algorithm work? The answer to this question is this that algorithms work simply by a method of computation which always requires successive steps of interdependent sequence of computation. If a particular process or matter is uncomputable then we cannot find a corresponding algorithm for the output of the result of the process which is uncomputable. But mathematically when we come to higher infinity or Godel's incompleteness theorem then this type of non algorithmic process always appears. For example when we are discussing the problem of continuum hypothesis, then continuum hypothesis arises only when we have to go from one scale to a higher scale of infinite. This hypothesis says that there is nothing in between these two scales. And this is the basic difference between finite and infinite. For example let M be a set which has 10 elements then the number of elements in its P(M) is 1024. Then between 10 and 1024 there are 1014 other numbers. And this number will increase if we go to greater and greater finite numbers but when we come to infinity all of a sudden situation change if M is infinite set than it's P(M) is also infinite but it's infinity is greater than infinity of M. And this process goes on forever. How far this can go is another problem in higher mathematics which also deals which the concept of infinity and it is explained in the following way.

Suppose M is infinite of first type than Card M = N0

Card P(M)= N1

Card P(P(M))= N2

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Card P(...P(M)....) = Nn

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From this we get the scale of infinite cardinals in the form

N0 <N1<..... <Nw<.....

This entire sequence forms a set which is countably infinite. As an open problem in mathematics and mathematical logic it is not clear that how far these ordinals are going. Whether they stop at €0^5 or they can still go further leaving this question temporarily aside, which I will deal with and discuss in some of my future research, I am returning to the present point of our discussion. This entire sequence form a set. Call this set H, now for any set we can get its power set and so P(H) can be defined and by Cantor's theorem H is smaller than P(H). Again the entire process which we have done before will be repeated here and so it can be concluded that in the case of infinity in particularly in the case of higher infinity algorithmic process of definite computation cannot work.

From the above mentioned discussion, which type of particular characteristic of human consciousness a perhaps according to my humble interpretation, the human mind can grass and think about consciousness and infinity because the human mind is directly enlighted by the light of consciousness which is from the transcendental self which is behind it. We are atma because we can think about infinity and so the human mind can assess infinity which is impossible for a computer or any artificially created mechanical device. Let me make this position more explicit with reference to Indian Philosophy. In our Upanishads for ultimate reality two terms are used ATMA and BRAHMA. The absolute identity between them is expressed in the Mahavakya of Upanishads. Now what is the definition of atma and Brahma? In taiteriye Upanishada the essential

definition of Brahma is given is, "सत्यं ज्ञानमनन्तं ब्रह्म"[6] so in our original form of reality we are having this three characteristics. One of them is infinite. As we are infinite we can access or think all disputes about infinity. Now what is the meaning of infinity here? We have discussed up to this point the mathematical meaning of infinity but the infinity of atma or Brahma contains something more than mathematical infinity. In the explanation of this essential definition of bramha the bhashya of Shankaracharya explains that this three metaphysical characteristics can be applied only to bramha. So we have three propositions and three are having same level of validity about Brahma. And this are

1. Brahma is Satya
2. Brahma is gyan
3. Brahma is Anant

This means that apart from Brahma nothing is Satya, nothing is gyan and nothing is Anant or infinite. In present the discussion of Satya and gyan is not directly related to our present theme so we are focusing our discussion on Brahma is Anant. Shankaracharya asks a question in the commentary of this Mantra that there are three types of infinity And this from des, kal and vastu. Which is mention as, "तत्र त्रिविधं ह्यानन्त्यं देशतः कालतो वस्तुतश्चेति।"[7] it is further explained in the bashya that Aakash is spatially infinite but Akash is not infinite with reference to time and object why? Because it is a creation or karya but a Brahma is not a creation or karya of anything, it cannot be limited by time and so it is beyond time and therefore it's infinity is different from the infinity of Aakash and still higher than it. In the same way Brahma is also infinite from objects. How this objective infinity can be defined and why is Brahma contains this type of infinity from vastu. Because it is completely in different from anything of the world. A thing can be put as different from another thing because it is not the same thing but there is no other thing apart from brahma which can be put is different from it again Shankaracharya explain this infinity in the following way, "भिन्नं हि वस्तु वस्त्वन्तरस्यान्तो भवति, वस्त्वन्तरबुध्यिर्हि प्रसत्काद्वस्त्वन्तरान्निवर्तते।"[8] And lastly Brahma is infinite with reference to space also because Brahma is the Karan of Aakash and so Brahm is infinite with reference to space. Again Shankarbhashya explain this as, "तस्मादाकाशादिकारणात्वादेशतस्तावदनन्तं ब्रह्म"[9]

Human being is not directly Brahma so all this does not apply directly to it but we are part or reflection of that ultimate reality therefore we are having some amount of Satya, Gyan and also of Anant in ourself and therefore we can think about infinity, discover the problems like continuum hypothesis and Godel's incompleteness theorem and many other research problems in mathematics and mathematical logic. We may hope that by someone this problem will be solved one day but that will be a human being not an artificially created machine.

Conclusion

In this paper I have attempted to show there is a close connection between concept of infinity continuum hypothesis and human consciousness. I want to emphasize this in my conclusion that human consciousness is somehow related to ultimate reality of Brahma and according to my belief at present also it is a ansh of Brahma. Therefore, I conclude here that continuum hypothesis cannot be an unsolvable problem and I decide to contribute at least conceptually from my side to make this problem more clear and try to solve it in the current line of research which has been done by Hugh Woodin, who has found a transitive set with a iterated model in which CH is false. At present I am attempting to understand the matter more explicitly and try to make it more apparent in some of my future research.

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