Original Article

Gödel and the Cyberspace: Rethinking Cyberethics

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Abstract
One of the epistemological debates on Cyberethics is the ethical implications of indeterminacy in cyberspace which results from its inherent zero-infinity binary logic. Since this logic is both of linguistic and mathematical nature, we contend that it can be discursively problematized. The central question here is: how can cyberethics be talked about in light of the fact that the zero-one binary in the cyberspace is regenerated endlessly and infinitely despite our invariant situation? The second question to be touch upon is: How can the problem of indeterminacy in the cyberspace leads to a crisis in our real -world cognitive schemas? Given that the indeterminacy in the cyberspace originates from a syntactic shift in its verification-falsification logic, we argue that this logic can be problematized by Gödel's Incompleteness Theorem together with Cantor's continuum hypothesis. To this end, the present paper situates itself within the axiomatic apparatus of these two scholars to rethink the cyberethics. It is an exploratory qualitative research, based on deductive approach, seeking to unearth an underresearched problem based on existing hypotheses. Methodologically, it is subsumed under library research for its drawing on books and theories that are directly relevant to the research problem at hand.

Keywords: binary logic, cyberethics indeterminacy, cyberspace, incompleteness theorem.

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Introduction and Statement of the Problem

One of the ethical challenges of the cyberspace is the question of indeterminacy and its consequential indecision where the truth value of the statements is unverifiable. This semantic problematic is immanent, not transcendent. Thus, we argue that it can be problematized by Gödel's Incompleteness Theorem. The point is that the indeterminacy of the cyberspace tends to be reproduced endlessly; hence, it never leads us to an invariant core of the meaning and decidedness. This arises from the fact that this space situates us ontologically and epistemologically in a double asynchrony: one between the inside and outside of the cyberspace and the other one within the cyberspace itself where lots of inner relations are at work. The birth of cyberspace is in fact the outcome of this double asynchrony as a new dimension. This situation in our view has a linguistic and mathematical nature and hence, is of discursive signification, because the cyberspace abounds in propositions with unverifiable truth values. To put it in a nutshell, there is neither an intersystemic nor an intrasystemic congruency at work. The question raised here is whether and how insights from Gödel's and Cantor's perspectives can contribute to explaining the problematic nature of this situation termed as cyberethics indeterminacy?

Methodology

The current paper is an exploratory qualitative research, based on deductive approach, seeking to unearth an underresearched problem based on existing hypotheses. It is subsumed under library research for its drawing on books and theories that are directly relevant to the research problem at hand.

Literature Review

With respect to Cantor's continuum hypothesis, Klein (2016) argues that the infinite sets include the integers, fractions and real numbers. In such sets, it is impossible to count the number of the subsets, because there is no limit in the process of counting. The fact that they are termed

as "infinite sets" does not clarify the ambiguity under question. With respect to this problem, according to the *Encyclopedia of Mathematics Education* (2020), Cantor coined the term "aleph-zero" or "aleph-null" which refers to an infinite or a transitive number. As can be inferred, the symbolism of numbers to signify infinity or transfinity- undecidedness, incompleteness- was a reaction to the problem that is the main concern of this study. The term "aleph-zero" is as informative as the number one billion. Counting to a billion is possible, but aleph-zero is uncountable. Cantor found this contradiction between logic and the traditional thinking. Based on inductive reasoning, in a relation of one-to-one correspondence, the set of positive integers includes a real-natural number if that number belongs to an inductive set (Adler et al. 1995: 3-4). But Cantor found out that no one-to-one correspondence with positive integers can be found in the numbers between 0 to 1. The reason is that a one-to-one correspondence between the positive integers and the numbers in between 0 to 1 will result in a contradiction.

On the basis of number symbolism that led to the discovery of algorithms, the following conclusions were drawn:

1. The relation between a number and an object in transfinity leads to a solution that is not countable in human mind.
2. A one-to-one correspondence between the positive integers and the numbers in between zero and one will lead to a contradiction.

Gödel employed these conclusions in the practice of coding in a new space where complicated extramental calculations are possible. The symbolism of infinity –indecision and indeterminacy as theorized by Cantor is still common among the scholars. Gödel was the first to employ the transinfinity and the contradictory correspondence between the positive integers and the numbers situated between 0 to 1 for the practice of coding. To do so, he needed a new space similar to human mind where he could do calculations. This practice led to computer programming and complicated the computational calculations. Thus, Gödel should be credited with inventing the cyberspace. Another achievement by Gödel was rethinking the syntax in the principle of verification and the truth coherence of the propositions. In the traditional mathematical logic, the verification of mathematical propositions depended on truth coherence of the propositions. Since the discovery of mathematical rules is on the basis of conjectures and by virtue of the fact that these conjectures need to be verified, formulating mathematical problems leads nowhere for the reason that conjectures can never replace reasoning (Smith, 2013).

As discussed by Raatikainen (2013), Gödel problematized the verification and truth coherence of the propositions and shed light

on the truth/falseness of the statements by demonstrating their contradictions: "If K is a coherent theory, G is not verifiable in K. If K is a … theory, the contradiction of G in K is not verifiable." But Gödel concluded that it is neither verifiable, nor refutable. Thus the symbolism of the numbers was replaced by algebraic symbols and signs. Then, Cantor conceptualized the transinfinity (Tall & Tirosh, 2001). Although it was opposed by some scholars for lacking any sense in the mind, it was embraced by the mathematicians. Gödel (1995) translated it into a code. The object-number relationship in the mind that had been conceptualized as *transinfinity* was re-conceptualized as a programming language outside the mind. This discursive reorientation left two major impacts in the history of mathematics:

a) A paradigm shift in the truth coherence and verification principle
b) The emergence of a cyberspace and the practice of coding (programming language) on the basis of transinfinity.

Thus, Gödel (1995) should be credited with the discovery of cyberspace and a pioneer of digital age. He received the Einstein Award, because he managed to incorporate the dimensionality into his mathematical creativity. But his effort in mathematicizing the syntax of language to rethink the verification principle led to a major problem in the history of mathematics: Heisenberg *uncertainty principle* (indeterminacy principle) and Schrödinger's *Cat Paradox*. The Cat Paradox led to the conceptualization of uncertainty principle in 1930. Considering the challenge of skepticism-inductivism, meta-inductivism, falsifiability-commensurability, scientific revolution and the theory of paradigms and by virtue of the fact that the relationship of space-dimension-field with the real or natural objects has gone through a change, the present study is aimed at scrutinizing this relationship in the light of fractal symmetry.

Epistemological considerations encourage us to be realistic. Newtonian approach suggested the concept of action at a distance, i.e. the point particles and the forces acting on them at a distance. The field theory suggested the idea of action by contact. This idea corresponds with the principle of local causality, however it assumes a new identity, i.e. the field. The theory of curved spacetime presented yet another image. Thus, with respect to Gödel's creativity in space-time, the symbolism of numbers is closely related to teleology in recursion principle (Larman, 2002: 314). It is still undecidable, unlimited, infinite, transinfinite and incomplete. In the light of this epistemology, fractal symmetry has complicated the universe. As in recursion principle and teleology of particles in space-time, the complexity of the universe and endless data mining once again has revived the symbolism of the

numbers. In other words, since 1930s, the 2000-year-long history of mathematics has once again confronted with the problem of indecision. The teleology and complexity of symbolism continue to be a crucial issue. How is the principle of uncertainty associated with teleology? The answer should be sought in the syntactic shift that took place for rethinking the consistency and verification principles.

Implications of Gödel for Cyberethics

With respect to the challenge raised by the conceptual logic of truth in the cyberspace and its representational regime, it can be argued that any input error by the operator and disregarding it by the regulator will result in a major output error. Since the system is of a structural stability, in cases of output errors, they will seem autistic, but they will not necessarily result in a social change. If a change occurs, it will be a prototype of the change, but not the change itself. It will be like a wind on a dry branch.

Ethical propositions in the network are multiple. A single picture is interpreted by different propositions, information and news. A single event is interpreted with different correspondent/inconsistent/contradictory propositions in the news stories. Why is the language of the network inclined to an anomic representation? Based on the semantic rules, the logic of a sentence is as follows: Any sentence can assume a value of either A or B and none is both. Thus, it has been termed as a "two-valued logic". It is the opposite of the "many-valued logic" where any proposition can have multiple values.

From a semantic perspective, it can be argued that the network follows a pattern similar to the logic of many-valued sentences. Drawing on Frege's account of natural language, it should be concluded that Pictorial language also follows a fuzzy logic. In the light of this epistemology, we will make an attempt to explain the difference between the interpretation in natural language and the interpretation in the cyberspace.

In natural language, the position of the user can influence the interpretation of the signs, but in the semiotics of the cyberspace there is a differentiation between the value and sense. Truth and falseness are specific to natural language, but the equivalent propositions in the virtual space generally have the same values. Accordingly, the virtual space should be looked at through the lenses of the theory of reference. In other words, when the messages in the virtual space represent an image, they refer to such clauses as "It isn't so.", "It seems to be so." and so forth.

According to the theory of reference, the use of semantic rules is never assessed by the benchmark of truth and falseness, rather it is the

syntagmatic and paradigmatic relations that matter. Language in the cyberspace is reduced to an expression: The pictorial expression with a degree of uncertainty. The major point here is information multiplicity that implies a degree of uncertainty. But it is interpreted as false. The reason is that unlike the conditional sentences in natural language, the semantic and causal relations in the virtual space are often ignored. In the virtual space, we are dealing with unreal conditional sentences: "If it were not so, this would not happen." Our argument here is that natural language in the form of a pictorial (visual) representation is a kind of "expression" not a translation or interpretation. In an "expression", the propositions may range from being inconsistent, logically invalid, contingent, to being true or false. How is the logic of sentences represented in a programming language based on this range? Through programming, one can generate dozens of sentences that are neither true nor false. And one can argue that none is true. But the question is that is such a situation an intrinsic property of this language? Can it be argued that the "expression" in a visual representation lacks in logic just because it is not the same as the natural language? What is undebatable about the "expression" is that in an "expression" one of the following semantic relations can be found among the user's positions:

- A contrary relation: When neither is true and both are likely to be false.
- A sub-contrary: When the both are impossible to be false together, but the both are contingent at the same time.
- A contradictory relation: When none of the "expressions" is of the same value.
- Implication: When it is possible that the antecedent is true, but the consequent is false: Implications can be categorized as: reverse implication (of the same truth value), and opposite implications.

In other words, a formal language can include all the varieties of the natural language. A natural language is not a normative system, so it cannot be described by a formal system. But the virtual space rhetoric requires that we see all the data of the same value. In fact, truth in natural language and value in the visual language of the representation can associate the truth-function relation. But this relation in itself is problematic. In the process of representation, all the functions with the value of x=0 indicate the transparency in the programming language. Based on the analysis of the derivatives, the integrals and the limit of functions, and also based on the infinite series and analytic functions, one can argue that here there exists a proportional relationship between the statements or the sentences. This relationship can be compared to the dice-throwing

game against the game tree. Based on the programming language, the statements determine the premises of the next movements.

In the programming language and in the visual representation, the error range cannot be calculated. A question that then arises is what criteria are used for a bandwidth? How does a bandwidth have to do with truth and transparency? How can transparency and programming language be assessed?

Transcendence in math as pursued by special relativity theory ended up in an intelligent network order. In other words, the transcendental number in math is undecidable. A transcendental sentence is one that cannot be described just by numbers or algebra symbols. The irrational numbers created a new man in the 21st century who is living not only in the real life, but also in a second life. Such dual-spacization of the world has been naturalized, so many unrests originate from it. Drawing on optic technologies including three-dimensional glasses, the users in the virtual space are able to see a third space between the first and second worlds. This emergent space enables the practitioners of digital games to create new characters in the real world. The correspondence between the two worlds seemed impossible in the past, but it is obvious now. It has culminated in the rise of a new intelligence among the users. Therefore, besides social and emotional intelligence, the human mind is about to assume a new capability. This emergent intelligence is seeking out a correspondence between the two worlds in a new dimension of the special relativity theory. It is in fact a new dimension in modern man that can be termed as *cyber intelligence Quotient*.

Non-Transparency in Cyberspace as an Outcome of Indecision

In data privatization, a kind of contradiction and mistranslation can be found between the dimension and "side". Any node stimulates the next node and then creates fantasies in dreams. As mentioned, transcendence in the mathematical language needs to be defined. The psychological state in the neural network refers to the psychological holes and nodes in the position of the user. It happens in the dream images or fantasies leading to miscalculations. The user's natural language in the physical world constantly transmits this transcendence to internet chats and cyber loafing, because the user's lifestyle is not an external entity, but it is an externalized internal entity that is constantly recreated in the fantasies.

The cyberspace users are constantly in an "exilic situation". They don't know where they are. They can be simultaneously anywhere. Accordingly, they are no longer exilic subjects. Or, they're like the displaced people who are everywhere, but not in their place. The fantasy

does not sublimate that desire in their neural network, but they are constantly directed to delusions and confusions by imagination. They're sitting somewhere, but they're everywhere. This ontological position is represented in the programming language as an existential position. This exilic situation in the visual representation creates more nodes in the field of synchronies. The result may not necessarily be a rupture.

There is no correspondence between physical life and cyberspace. One cannot think of the negation of negation here and thus; a double negation cannot be concluded.

There is a contradiction in the relationship between physical space and cyberspace where de-formation is obvious. It can be concluded that we perceive the nerves and actions resulting from the process of representation in the network when we perceive the difference. In other words, from the perspective of dual Spacization, it can be argued that there is a difference between dimension in the physical space and sides in the cyberspace. There are two major differences in the statics and neural involvement of the represented person and the physical person. The dimension theory is the union of two non-empty sets in which both closure-closure intersection of A with B and the closure intersection of B with A are empty. This food can be digested in any way, but controlling this situation has created a kind of ill-shaped society, a society suffering from deformation and disintegration. By borrowing from Carnap allegory, such a deformed and ill-shaped society can be compared to a "bubble chamber" in which children enjoy blowing. Talking about this pleasure is like the pleasure of surfing the net. It was argued that transparency replaced truth and falsehood, but what kind of transparency, based on what theme and in which user's position?

Anomic Situation in Cyberspace

As a medium, the cyberspace creates a kind of individuality in its textual natural state that is solipsistic, a state in which one sees himself/herself alone and separate from alter ego. People find themselves disconnected from each other in the real world. So, they enter the realm of cyberspace where they create online communities and situate themselves in the realm of representation and visualization. Thus, borrowing from Merleau-Ponty, their mental imagery is created. Their mind is occupied by many concerns: a ghost of insecurity, work-related concerns, unemployment, livelihood and everyday life needs, poverty, political demands, freedom, the decline of values, and so on. This self-consciousness and asynchrony between the physical/virtual worlds culminate in carnivalesque subversive practices in them and the disintegration of the self. Although

they are networked virtually, they are lacking in communicative skills in the real world. This is similar to an anomic situation in the society.

Conclusion

The problem of indecision and the radical uncertainty in the cyberspace has created different operator-regulator relations in the countries around the world. It has culminated in a mass dictatorship– filtering and panopticism. The operator-regulator relation has led to either a mass dictatorship and populism, or strict filtering policies. Although internet governance may be shared by the civil society, in countries suffering from state dictatorship and social anomia, it is highly problematic. The indeterminacy in the cyberspace has added a new dimension to human intelligence, because it is highly associated with transinfinity, infinity, limitedness and indecision. That is why the truth value of the propositions in the programming language needs to be verified through a meta-induction or the induction of the websites with more or less similar content. But this is not a good solution, because new dimensions are involved in shaping the inductions and they are not necessarily faithful to the similar reference groups due to the high speed in which the data are disseminated.

In the regulator-operator relation, internet governance is very significant, because this dichotomous decision should be made: dictatorship of the majority (the masses) or tyranny of the minority (the ruling power). It is beyond the scope of this paper to discuss how this indeterminacy leads to the tyranny of majority or minority. It needs a separate study. Transinfinity remains to be problematized. It is an infinite power. Understanding it is the key to the cyberspace policy.

This study was an attempt to present a preliminary scheme of synchrony and asynchrony as a problematic. Against the backdrop of this problematic, the central argument is that in the third world countries prone to the activation of such faults as family, gender, religion, and nationalism, the data mining and interpretation of the data in the virtual space will result in the reproduction of subjugation and the hegemonic discourse. Since there is no transparency discourse in such countries, a minor miscalculation about the system inputs will result in major errors in the system outputs. That is to say, the discrete groups- in the case of systemic disorder are represented as continuous activists. This is not necessarily a real change or a real subjectivity, but rather a kind of disruption in the functioning of the system.

The synchrony of these events with the outside of the network on the one hand and the asynchrony of the operator-regulator and the

system besides the sequence of synchronies tend to create an internal "consistency" between discrete groups. Thus, a crisis comes out. The intelligent order within the network is decentralized. Its local form in capitalism has been designed incomplete. But this project has detected a new capability in human mind by blurring all the traditional boundaries. This new intelligence should be a topic of heated scholarly debates for its redefining the human being.

Ethical considerations

The authors have completely considered ethical issues, including informed consent, plagiarism, data fabrication, misconduct, and/or falsification, double publication and/or redundancy, submission, etc.

Conflicts of interests

The authors declare that there is no conflict of interests.

Data availability

The dataset generated and analyzed during the current study is available from the corresponding author on reasonable request.

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