Multiple Realizability in the Nature of the Mind and Its Implications for SETI

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Abstract

Responding to Putnam's computational hypothesis of the mind and the adoption of the Turing machine, it is argued by Churchland and Searle (biological naturalists) that the implementing organic structure is necessary in understanding the nature of mental states. This paper notes that if the term "necessity" is understood in terms of "withoutness," then it is argued, from the idea of multiple realizability, that no particular implementing structure is necessary to the nature of the abstract mental state. Furthermore, drawing implications from the analysis, the paper shows how limited and unjustified human understanding and generalizations about the issue of mental states can be when viewed only from an anthropocentric perspective, and the dire implications this brings on the search for extraterrestrial intelligence (SETI). The paper concludes that there is a need to review our methodology and reorient our technology to make a more promising search. The paper employs philosophical argumentation and analysis as tools of assessment of the metaphysical hypothesis.

Keywords: *phenomenal experience; implementing system; mental state; intelligence; extraterrestrial intelligence*

I. Introduction and discussion of the problem

It is argued in the literature by Ned Block and Patricia Churchland respectively that cooperation and co-evolution between computational hypothesis and neuro-physiological account are expected to provide the desired sufficient account of the nature of mental states.[1] This suggests that both Put-

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[1] Patricia Churchland, "The Co-evolutional Research Ideology," in *Readings in Philosophy and Cognitive Science*, ed. Alvin Goldman, 745-768 (MIT Press, 1993), 745. Ned Block, "The Computer Model of the Mind," in *Readings in Philosophy and Cognitive Science*, ed. Alvin Goldman, 819-832 (MIT Press, 1993), 824.

nam's computational hypothesis and neuro-physiological account are necessary and sufficient for the understanding of the nature of mental states. This view is based on Searle's and Churchland's conviction that mental states are causally produced by the activation of C-fibres in the brain. This is a response to Putnam's abstract computational nature of the mind, which resulted from the adoption of the Turing machine.[2] It means that as the stimulus input strikes the nerve endings, it institutes a neural process which triggers the activation and firings of relevant and appropriate neurons, and this involves some form of energy transfer.[3] Based on the assumption that mental states are "caused by and realized in the neurophysiology,"[4] it appears that it is part of the nature of C-fibre firing in the brain to produce and transfer energy to which Searle was so emphatic.[5] For him, the C-fiber firing occurs at the lower level of the neural process. This lower-level C-fibre firing causes the mental states at the higher level. The neural firings process produces a corresponding mental state.[6] However, Searle has not yet provided a strong explanation on how the brain does it or the sorts of chemical process which combine to produce mental states.[7]

The point that "any causal power the machine might have to cause consciousness, and intentionality would have to be a consequence of the physical nature of the machine,"[8] may seem to imply that the nature of the implementing physical structure which implements the abstract state description is so necessary for an adequate account of the mental states. In fact, this is the view held by Churchland and Searle respectively. However, the term *necessity* of the implementing structure appears ambiguous. What is of interest is the point that as much as multiple realizability is concerned, no particular implementing structure is necessary in re-

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[2] Alan M. Turing, "Computing Machinery and Intelligence," *Mind* 59, no. 236 (1950): 433-460. The Turing machine has been described by Putnam as "a device with finite number of internal configurations, each of which involves the machine's being in one of a finite number of states, and the machine's scanning a tape on which certain symbols appear." This is a complex organism which implements programs by converting information into symbols and then processing them based on the specified machine table.

[3] John R. Searle, *Philosophy in a New Century: Selected Essays* (Cambridge University Press, 2008), 61; Derk Pereboom and Hilary Kornblith, "The Metaphysics of Irreducibility," *Philosophical Studies* 63, no. 2 (1991): 125-145; Derk Pereboom, "Robust Nonreductive Materialism," *Journal of Philosophy* 99, no. 10 (2002): 499-531.

[4] John R. Searle, "The Critique of Cognitive Reason," in *Readings in Philosophy and Cognitive Science*, ed. Alvin Goldman, 833-847 (MIT Press, 1993), 834. See also Churchland, 745.

[5] Searle, *Philosophy in a New Century*, 70.

[6] Adams and Beighley raise some issues against Searle's perspective and present a different view on the issue. See Fred Adams and Steve Beighley, "The Mark of the Mental," in *The Continuum Companion to Philosophy of Mind*, ed. James Garvey, 64-72 (Continuum International, 2011), 66-67.

[7] Ibid., 72.

[8] Ibid., 62.

lation to the abstract mental states. As a fall-out of this assumption, one of the main questions addressed in the paper is; what implications do these have on the belief in anthropocentricism and the troubling issue of Search for Extraterrestrial Intelligence (SETI). Demonstrating with multiple realizability, the paper notes that, (1) there are multiples of appropriate implementing structures capable of implanting a particular abstract computational state; (2) anthropocentricism is an unassailable limitation to understanding the true nature of mental states and by implication intelligence; (3) it is very plausibly argued that there is a strong possibility of a multiplicity of alien/extraterrestrial intelligence, especially when intelligence is conceived as a function of an abstract mental state. Therefore, the paper argues that "intelligence" should be inclusively and widely defined to provide for a possibility of *coming across* alien intelligence.

II. "Necessity" as withoutness in the structural hypothesis

This section introduces Putnam's machine table. Machine table is what accounts for the functioning of the Turing machine. That is why for Putnam, the machine table describes any Turing machine.[9] This means that machine table is what instructs the machine on what to do when a particular input is received.

> The 'machine table' describes a machine if the machine has internal states corresponding to the columns of the table, and if it 'obeys' the instruction in the table in the following sense: when it is scanning a square on which a symbol s_1 appears and it is in, say, state B, that it carries out the 'instruction' in the appropriate row and column of the table (in this case, column B and row s_1). Any machine that is described by a machine table of sort just exemplified is a Turing machine.[10]

The idea of *Row* and *Column* may be appreciated in a sample machine table below, specifying implementable and computable functions.

		A	B	C	D
(s1)	I	s1RA	s1LB	s3LD	s1CD
(s2)	+	s1LB	s2CD	s2LD	s2CD
(s3)	blank Space	s3CD	s3RC	s3LD	s3CD

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[9] Hilary Putnam, "Minds and Machines," in *Mind, Language, and Reality: Philosophical Papers, Volume 2*, ed. Hilary Putnam, 362-385 (Cambridge University Press, 1975), 365.

[10] Ibid.

For instance, if the instruction says, "if you read or scan 1 as input, print 11, proceed to scan the next square to your left, then shift to state B," the machine is constrained by this instruction and cannot perform otherwise. A typical interpretation of machine table instruction is given by Putnam.

> These instructions are read as follows: s_5L A' means 'print the symbol s_5 on the square you are now scanning (after erasing whatever symbol it now contains), and proceed to scan the square immediately to the left of the one you have just been scanning; also, shift into state *A*.[11]

This is an example of an implementable instruction which is contained in the machine table. Possible machine table instructions include: S_1LA, S_2LB, S_3RA, or S_4LD. Each of these programmes is an appropriate instruction. For instance, in the Putnam's computational hypothesis, S_3LB may read as; print S_3 on the square you as now scanning (after erasing whatever symbol it now contains) and proceed to scan the square immediately to the left of the one you have just been scanning, also shift into state B. This is the programme which this machine is to implement if it is appropriate to implement it.

In Putnam's hypothesis, this machine table is abstract and then can be implemented by multiple appropriate physical substrates. The machine programmed to implement an abstract computational instruction cannot do otherwise. It is a deterministic automaton. Notwithstanding, one of the main weaknesses identified against Putnam's computational hypothesis is that it is incapable of accounting for phenomenal experience, which is considered to be a necessary property of the mental states. The biologists argue that computational hypothesis is designed only as a mere symbol manipulation. Consequently, it appears to lack the properties sufficient for actualizing mental states. If this is true, it may plausibly question the possibility of a moral machine.[12] Let us assume that the complete nature of mental states is contained in the abstract machine table. It follows that a particular implementing system, expectedly, implements all that is contained in the instruction and for Putnam, that is all there is to being a mental state. This implies that phenomenal experience is part of mental states, then it is expected to be contained in the instruction and be eventually implemented. Just as phenomenal experience, so is intelligence to be understood as a function of an internal process which is also part of mental states. Being intelligent, therefore, depicts a state which, perhaps, is abstractly and computationally definable relative to

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[11] Ibid.

[12] Michael Anderson et al., "Towards Moral Machines: A Discussion with Michael Anderson and Susan Leigh Anderson," *Conatus – Journal of Philosophy* 6, no. 1 (2021): 177-202.

and being implemented by a relevant implementing structure. If this is true then it is also capable of being multiply realized by different appropriate implementing systems. How this is implemented turns out to be a function of each implementing structure.

Hilary Putnam's hypothesis that the same mental state can be realized by different brain states, and/or that the same brain state can realize different mental states, has become orthodoxy in the philosophy of mind.[13] It means that a token abstract mental state is capable of being implemented by more than one implementing structure.[14] That explains the possibility of a multiplicity of the equally possible and appropriate implementing substrates as well as corresponding expected raw experience and intelligent states. The attendant raw experience may range from phenomenal experience to *silicomenal* experience, or *metalomenal* experience, and so on, depending on the nature of a possible and appropriate implementing structure. Intelligent state will also manifest depending on the nature of the respective internal process of the implementing structure. That there is multiplicity of implementing structures suggests that no particular structure is necessary, if "being necessary" is strictly read in the sense that without the implementing structure, there could be no abstract (mental) state.

This implies that if "necessity" is defined in the sense of "withoutness," then no particular implementing structure is necessary in the nature of the abstract instruction. What this suggests is that a particular implementing system is only sufficient but not necessary in relation to the nature of the abstract mental state. If any of these were necessary, then using Kant's understanding of "necessity,"[15] the relationship should have been either that of identity or of containment.

The notion of containment is not relevant to the current discussion. But, dislodging the idea of identity requires some clarification. This is illustrat-

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[13] Jerry A. Fodor, "Special Sciences (Or: The Disunity of Science as a Working Hypothesis)," *Synthese* 28 (1974): 97-115; Lawrence Shapiro, "Multiple Realizations," *Journal of Philosophy* 97, no. 12 (2000): 635-654; William Bechtel and Jennifer Mundale, "Multiple Realizability Revisited: Linking Cognitive and Neural States," *Philosophy of Science* 66, no. 2 (1999): 175-207. See also Carl Gillett, "The Metaphysics of Realization, Multiple Realizability, and the Special Sciences," *The Journal of Philosophy* 100, no. 11 (2003): 591-603; and Robert Francescotti, *Physicalism and the Mind* (Springer, 2014), 1-3. Ross, however, approached multiple realizability from the context of causal connection in biology; Lauren N. Ross, "Multiple Realizability from a Causal Perspective," *Philosophy of Science* 87, no. 4 (2020): 640-662.

[14] The notion of multiple realizability has been strongly criticized. See an example of such in Bechtel and Mundale, 1999. Betchel and Mundale suggests *Multiple Consilience* as an alternative which suits neuroscience in guiding our understanding of cognitive systems.

[15] The Kantian sense of "Necessity" is understood in terms of contradiction. For him, a denial of a necessary proposition raises a contradiction. For example, 'The woman is not a female." In the case under discussion, it is understood in the sense that it is impossible to have a particular implementing structure without the abstract mental state. Immanuel Kant, *Critique of Pure Reason*, trans. John M. D. Meiklejohn (J. M. Dent & Sons Ltd., 1978).

ed using these epistemic cases. (1) Only neurophysiological structure implements abstract mental state; (2) only 7+5=12, and (3) only object that extends is matter. A careful inspection of these three statements will reveal some truth. First, statement 3 appears to be necessarily true conceptually, where "necessity" is understood either directly with the relationship of identity or indirectly with that of containment. Even while recognizing Quine's naturalism, it appears impossible to arbitrarily deny the necessary truth of this statement without preparing to step into inconsistency or rupture our linguistic structure. Quine also admitted that statements such as "unmarried men are unmarried" are true come what experience may, only that every epistemic statement is a *de facto* member of a holistic epistemic system.[16] These are examples of statements which, according to Quine, form the nucleus of his system, hence are less susceptible to experience.

Statements 1 and 2 do not possess such sense of necessary truth as 3. For instance, statement 1 cannot be true any more than 2 is true. In the sense of identity, a simple translation of 2 says, for all X, if X is 12, then X is identical to 7+5. Going by the "identity" nomenclature employed here, there is an issue to be explained. This is saying that 12 and 7+5 are identical. That is, (a) 12 is the same thing as 7+5, and (b) nothing else could be 12 apart from 7+5. This breakdown apparently exposes the difficulty in maintaining that statement 2 is necessarily true even when we try to avoid the question raised by "same thing as". First, by mere token representation, it is clear that 12 and 7+5 are not identical. In fact, the correct numerical breakdown of 12 is 1 tens and 2 units, the summation of which is also represented by 10+2. Would that imply that 12 and 10+2 are more identical than 12 and 7+5? The point is that 10+2 is a direct componential breakdown of 12 rather than 7+5; it is not that one is more identical mathematically.

Second, in the strict sense of identity, 12 is neither identical to 7+5 nor to 10+2. This is because there are numerous mathematical relations which can be equal to 12. Examples are 6+6, 9+3, 8+4, 11+1, 13-1, etc. The point which becomes clear is that 12 is multiply realizable by different appropriate mathematical relations within the mathematical system. It follows that 7+5 and 10+2 are not necessary to realizing 12; they are only sufficient in the sense of necessity of an implementing system in relation to abstract mental state. The same thing applies to statement 1. Therefore, no one particular implementing structure is identical to and therefore necessary to the nature of the abstract mental state. Without electrochemical organic structure, abstract mental state can be implemented by other possible sufficient implementing systems. Therefore, if "necessity" is understood in the sense of "identity" or

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[16] Willard Van Orman Quine, *From a Logical Point of View: Logico-Philosophical Essays* (Harvard University Press, 1961), 42-43.

"withoutness," then electrochemical-based structure is not *necessary* in the nature of the abstract mental state. However, when considering the internal process peculiar to a particular implementing structure, the issue of necessity may be raised in relation to what experience is produced no doubt. It is rarely in this sense that neurophysiological implementing structure might be deemed necessary in producing phenomenal experience which is peculiar to organic structure alone.

III. Effects of anthropocentrism on the hypothesis

The focus of this section is to show that anthropocentrism is a questionable inhibition against the adequacy of the required knowledge concerning the nature of mental state and by implication, intelligence. Anthropocentrism is a belief that human beings occupy the central determinant position in the universe. That is, and this has played out in all research attempts and inquiries; all phenomena, ontology, definitions and description are human dependent and determined. This belief is accentuated by the biblical depiction in Genesis chapter 2, verse 19.

> And out of the ground the Lord God formed every beast of the field, and every fowl of the air; and brought them unto Adam to see what he would call them: and whatsoever Adam called every living creature, that was the name thereof.

However, much as this appears to be soothing, it poses a danger in the sense that it constitutes a seemingly unassailable hindrance in the understanding of the real nature of mental states. By 'real' I mean the original human independent nature. This anthropocentric belief looms large over judgments, assertions, points of view, beliefs, etc., and it manifests in every attempt to pursue an inquiry into the nature of reality in every aspect of human inquiry. A thing is seriously and unapologetically assumed to be whatever human beings can prove or define them to be! Presumably, the issue of the nature of mental states will become pretty convenient to deal with, once we can conceive that strictly speaking, human being is only *a* componential part, and not the sole determinant of nature.

Building upon the thesis of multiple realizability, and an insight into anthropocentrism, there are some observable points which are congruent to the issue of discussion. First, a fallacy ensues if one were to assert that the capability of internal states leading to the possibility of mental states is only restricted to human electrochemical property. On the contrary, it is strongly assumable that there are multiples of implementing system in the world, with an appropriate implementing structure, which are capable of implementing

the abstract machine table leading to the possibility of internal states. Arguing otherwise may be running into *ad ignorantiam*.

Second, electrochemical implementing structure should caution against over-assumption that only this category, capable of realizing mental states, is able to possess phenomenal experience and thereby, for instance, feel pain or be intelligent. Plausibly, electro-metallic, or silico-metallic, etc., which are other possible systems might possess advanced processing structure just as, or more than, human's electrochemical system. Then, the question now is no longer; what category of the animate is capable of possessing mental states, but, rather; which category of systems, in nature, is incapable of implementing a particular abstract state *depending* on its own implementing structure? This is because the probability of the assumption that a silico-metallic system is able to realize an experience through its internal process, similar to human feeling of pain is very strong.

Third, as "we theorize that our universe may be rich with planets populated by intelligent beings who, like us, can search for evidence of other technological civilizations,"[17] it follows that being *intelligent*, which is considered a property of mental state, may be multiply realized by several appropriate implementing systems, again, relative to the nature of their implementing structure. This is because being intelligent, as already demonstrated, depicts a possible state which is abstractly and computationally definable relative to a relevant implementing structure. This state can also be multiply realized by different appropriate implementing systems.

The difficulty here is not in the assumption of multiple realizability, but in the perceived and troubling effects of anthropocentricism. This is because it is assumable that biological function of the electrochemical system might restrict it from ascertaining the possibility of other implementing structures capable of realizing intelligence beyond the level of mere assumptions. The level of mere assumption is the hypothetical level of attributing intelligence capacity to other systems from or by human judgment alone. To justify beyond the level of mere assumptions, there must be the ideal- implementing-structure whose system superintends overall. Nonetheless, this is what Putnam[18] argued that only God (whatever this may mean or refer to)[19] could

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[17] Bernard M. Oliver, "The Windows of SETI – Frequency and Time in the Search for Extraterrestrial Intelligence," *The Planetary Report* 7, no. 6 (1987): 23-25.

[18] Hilary Putnam, *Representation and Reality* (MIT Press, 1988), 89.

[19] For the view that metaphysical anthropocentrism requires and implies monotheism and thus we are ontologically committed to God, see Åke Gafvelin, "No God, No God's Eye: A Quasi-Putnamian Argument for Monotheism," *Conatus – Journal of Philosophy* 6, no. 1 (2021): 83-100.

have. Nagel's[20] question; "what is it like to be a bat?" is a mortal question indeed serving to justify this restriction. Therefore, when 'being intelligent' is seen as an abstract state of the mental, then there is nothing that says that other natural systems are incapable of realizing intelligence.

Just as Jackson[21] argues, the electrochemical system should therefore be wary of imposing human judgment on other objects or systems in the cosmos. The fact, if it is a fact, that electrochemical may not completely fathom the true nature of an internal process and experience of other systems does not warrant that they (other systems) should be conceived as incapable of realizing some states. This reasoning, correspondingly, challenges Tye's assumption; "Thus, when I feel pain, and I believe that I do, my Zombie replica believes that he feels pain too. It is just that his belief, unlike mine, is false."[22] This assumption is purely based on the privileged information that human beings have regarding the internal make-up and configurations of the zombie, nothing more.

IV. The existence of aliens/extraterrestrial intelligence: Redefining the question

The question which has been seriously troubling the *Homo Sapiens* is whether or not there is extraterrestrial intelligence out there. This question, definitely and quite clearly, has a place in this discussion. This is because intelligence is described as a function of internal state of an implementing system. Consequently, search for signs of life, alien cultures, and intelligence around the universe are part of the main scientific concerns. Existence of aliens is commonly believed to be a hoax and supported by rumors, in some quarters, some of which are through alien sightings with their disc/saucer-like-craft, which is being manned by the little green big-headed beings. However, the search for the possibility of extraterrestrial intelligence or life appears as a worthwhile scientific enquiry in the cosmos. This is what foregrounded the space inquiry and search into the universe which are within the purview of Search for Extraterrestrial Intelligence (SETI). Apparently, human curiosity accounts for more seriousness in the search. Our neural triggers push human curiosity to want to inquire, to want to meet, and, perhaps, interact with our cosmic friends around the universe! The discovery of advanced telescopes for deep penetrations into the hearts of planetary bodies in the universe, also increases this curiosity on the possibility to meet this possibly metallic-made little man.

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[20] Thomas Nagel, "What Is It Like to Be a Bat?" *The Philosophical Review* 83, no. 4 (1974): 435-450.

[21] Frank Jackson, "Representation and Narrow Belief," *Philosophical Issues* 13 (2003): 99-112.

[22] Michael Tye, *Consciousness Revisited: Materialism without Phenomenal Concepts* (MIT Press, 2009), 191.

However, the point of note is that the methodology and the theoretical frameworks adopted in the search appear to be narrow regarding the conceptual construal of what 'intelligence' is. In line with the view of Slijepcevic and Wickramasinghe,[23] 'intelligence' is largely and restrictively defined from electrochemical point-of-view. This thesis has technically conceived 'intelligence' as a function in the electrochemical abstract mental state. In layman's terms, and simply put, intelligence is observed as a mental capacity which is exhibited by human beings, (electrochemical system), to enable them to appraise and solve problems. This point-of-view, however, explains the quantitative nature of the search. The term "quantitative nature" is employed in the sense of the belief that alien intelligence could be found if and when alien life is found, hence, the point-of-view, methodology and theoretical framework adopted. Whereas to appraise better, we may need to be ready to *sidestep* the electrochemical encumbrances. This is the real issue! This might help to review our methodology and reorient our technology. Reviewing our methodology raises the question of turning a search light towards ourselves with a view to re-examining how human cognitive ingenuity has produced the framework for the present methodology. This may also include evaluating the methodology of its possible limitations. Reorienting our technology is an inevitable and logical result of a sufficient reviewing of our methodology. This may become rewarding eventually as the question may need to be redefined for a more fruitful search.

Side stepping our electrochemical encumbrances may help to distinguish the question of a 'search for life' from a 'search for intelligence'[24]; the two questions which ordinarily appear similar but are sufficiently different. This is so because, according to the view of Hisabayashi,[25] there should be a distinction between a search for extraterrestrial life, and intelligence. However, whereas the definition of a search is expected to be initially and clearly clarified, there is no doubt that the two questions constitute genuine reasons to initiate inquiries into a search. Suppose for instance that human beings have been searching for signs of an intelligent electrochemical organism, on the

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[23] Predrag Slijepcevic and Chandra Wickramasinghe, "Reconfiguring SETI in the Microbial Context: Panspermia as a Solution to Fermi's Paradox," *Biosystems* 206 (2021): 104441.

[24] See Nathalie A. Cabrol, "Alien Mindscapes – A Perspective on the Search for Extraterrestrial Intelligence," *Astrobiology* 16, no. 9 (2016): 661-676. Some researchers, however, actually defined their search towards extraterrestrial life in the universe. For example, see much more defined enquiry which is about the possibility of extraterrestrial life in Steven J. Dick, "NASA and the Search for Life in the Universe," *Endeavour* 30, no. 2 (2006): 71-75; Baruch S. Blumberg, "Astrobiology, Space and the Future Age of Discovery," *Philosophical Transactions of the Royal Society A* 369 (2011): 508-515; Carol E. Cleland, "Moving Beyond Definitions in the Search for Extraterrestrial Life," *Astrobiology* 19, no. 6 (2019): 722-729.

[25] Hisashi Hisabayashi, "An Encounter with Extraterrestrial Intelligence," *Biological Sciences in Space* 17, no. 4 (2003): 324-340.

assumption that only humans can be intelligent, then it is not impossible to find, just in case there are such organisms out there! This is but an easy problem because we actually have a fore-knowledge of what should constitute the object of the search! It may be noted here that search for signs of life dominates though.[26] Take for instance an infographic of a seven-level framework invented by National Aeronautics and Space Administration (NASA) to help people put "signs of alien life" discoveries in context.[27] The case is expected to be different when the search is narrowed to intelligent beings alone. This is because, eventually, there may be no necessary connection between being an extraterrestrial being and being intelligent.

One of the main technical implications of our findings in this paper is the strong possibility of multiples of appropriate implementing structure capable of intelligence. Even, the possibility of these intelligent structures existing around human domain is not ruled out. Curiously, this seems challenging in the sense that it may suggest that any object around us may be capable of implementing an abstract program to realize intelligence, once it possesses an appropriately implementing structure. Inclusively, the term *alien* may have to be redefined to include any non- human system with capable implementing structure, which is able to implement similar states as electrochemical structure. So, this is it! It follows that man's intelligence is a token realization of the abstract intelligence in the universe. Following this consistent implication, there is therefore no doubt to the possibility that multiples of other appropriate implementing structures, capable of implementing and then manifesting intelligence in the universe, exist. It may be, therefore, strongly inconsistent to presume, either that only human beings are intelligent, or that man's intelligence superintends over, or determines the nature of other *intelligence(s)*. Both conjuncts are assumptions which evidently run deep into the dungeon of anthropocentricism, the dungeon which implicitly inhibits man's freedom to really appreciate, investigate, and truly explore *what there is*. Therefore, absolute reliance on human conceptualizations, hypothetical conjectures, and methodology framework, defined signs, and properties of life, might significantly make it pretty difficult for human beings to ever correctly apprehend and appraise the nature of extraterrestrial intelligence and even life.

Though this hypothesis arguably supports the existence of multiple species (appropriate implementing systems) of intelligence, a pressing question is; can

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[26] See Nathalie A. Cabrol, "The Coevolution of Life and Environment on Mars: An Ecosystem Perspective on the Robotic Exploration of Biosignatures," *Astrobiology* 18, no. 1 (2018): 1-27.

[27] Matthew Hart, "New NASA Chart Puts Signs of Aliens Reports into Context," *Yahoo! Entertainment*, https://www.yahoo.com/entertainment/nasa-chart-puts-signs-aliens-124335774.html?.tsrc=fp_deeplink.

human intelligence ever come across alien intelligence? From this hypothesis, though it may appear unsupported that a silicon- based structure might fully make sense of the neural workings of the metallic-based structure or electro-chemical-based structure, it may not be impossible, especially when we can *review* our methodology and *reorient* our technology. That means, there is, first, the need to deal with ourselves before launching our search or research out. This owes to the fact, if it is a fact, of asymmetrical nature and structures of various implementing systems. Electrochemical structure will define other structures by its own limited and narrow methodology and conceptualizations. Ditto for other implementing structures! But electrochemical structure is not the only structure that can realize intelligence in the universe. What turns out to be clear is that man's view about what counts as intelligence and its signs is still critical and could be redefined. This is to say that a great deal is still necessarily required for the search to produce the desired result.

V. Conclusion

Multiple realizability features so prominently in Putnam's abstract computational approach to the issue of the nature of mental states. Whereas this has been variously criticized and, in some cases, rejected by the identity theorists. They argue that the implementing physical structure is necessary in understanding the nature of mental states and any theory which ignores this is insufficient. In the relationship between the abstract states and the implementing structure, the paper demonstrates how multiple realizability shows that no particular implementing structure is necessary.

Arising from the hypothesis, if 'intelligence' is a function of the mental state, the paper deduces the possibility of multiple intelligent systems in the universe, where human intelligence is just a unit. The paper, therefore, challenges the basis of anthropocentrism which appears as an inhibiting and limiting factor in the search for the real nature of mental state and of reality. This paper argues that anthropocentrism could be overcome when we can redefine 'intelligence,' review our methodology, and reorient our technology to help the Search for Extraterrestrial Intelligence (SETI) to be more fruitful.

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