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Machine Minds: The Blueprint of Artificial Consciousness

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Abstract

The paper proposes the design approach as a blueprint for building a sentient artificial agent capable of exhibiting human-like attributions of consciousness. The paper also considers whether if such an artificial agent is ever built, how it will be indistinguishable from a human being? Well, it is glowingly evident that the evolution of artificial intelligence is guided by us, humans, whose own mental evolution have been shaped by the passing years in the course of the phenomenology of adaptation and survival (Darwinian). Yet, the evolution of synthetic minds powered by artificial cognition seems to be quite fast. Yes, the artificial mind in robots, if we accept the analogy 'mind' in its fullest sense, that day is not very far when the mental embodiment of consciousness in machines would become reality. But prior to such a feat becoming reality, rhetoric debates have been taking shape as of, how to decode and cipher consciousness in machines, a phenomenon considered as often as 'nonentity', then, what would be the true essence of such an artificial consciousness? This paper discusses these aspects and attempts to throw some new light on the design and developmental aspects of artificial consciousness.

Keywords: Artificial Consciousness, AI, Human-Machine Interface, Robotics, Neural Network

1. Introduction

This paper addresses several questions relating consciousness to artificial intelligence, and creating a fascinating intersection between artificial and human consciousness. It explores how one might design a system that is an artificially conscious agent capable of exhibiting human-like behaviors. The pace of progress in AI-based technology has been rapid, and since the paper was written a decade back, today, we have advanced AI agents like the ChatGPT and other advanced Chatbots working on the principles of generative language models or that uses generative large language models based on artificial neural network (ANN), which has brought machine consciousness to the forefront of a future possibility (Dodgson, 2023; He et al, 2023) On this issue, very recently, I have had the occasion to ask the freely available ChatGPT program "*Hello ChatGPT, can you, with accuracy, trace back your motives for an action you have performed?"*
It has an answer which I received as follows: "*As an AI language model, I don't have personal experiences or motives like humans do. However, I can explain the process behind actions or decisions based on the information and instructions I've been programmed with or trained on. Everything I generate is based on patterns and data rather than personal intent or consciousness..."* Well, it explains many things, but raises many more questions.

If we are to understand and decode consciousness, we must first understand its origin and the architecture that gives rise to it. By developing a blue-print for a system to become artificially conscious, this paper touches on the various aspects of machine consciousness which might become a reality, sooner. The attempt can be unfolded by studying human behavior, imitating them, and closely understanding the mechanics and interactions that underlie the cognitive processes that are likely to give rise to such a synthetic conscious system. Second, the problem of embodiment of consciousness in machines could a big issue for the machine to handle, if it were to behave exactly as humans do, for machines still do not have the subjective experiences like we do.

On the question of design concepts, embodied cognition in artificial entities now seems a possibility, though devising computational models that can replicate the conscious processes akin to human beings raises some ethical questions, beyond the questions of possibility. These are the burning issues that has been discussed in this paper related to the development and genesis of machine consciousness to aid further evolution in robotics. Can we empower our robots with consciousness? As Harnad has asked in his paper about whether can machines be conscious, and if, then how, questions like these have already begun to linger in our minds that have been slowly, yet steadily, reshaping our notion toward such artificial peers of intelligence (the robots) which is but an attempt to realize in such structural and functional framework the possibility of designing artificial conscious entities [1,2].

Interestingly, Sloman and Chrisley mentioned an approach much based on Daniel C. Dennett's proposals about virtual domain defining mental states in virtual machines running on the parallel material of the natural brain. The attempt has been to initiate an artificial simulation of mental states in such virtual machines that might generate machine behaviors which is likely to mimic human conduct. In his book *'The age of Spiritual Machines'*, Futurist Ray Kurzweil voiced about such humanities' possibilities on the frontiers of computational power where he has speculated about the time when computers would achieve and even surpass human level of intelligence. The book also mentions about the possibility of developing virtual machines with human-like consciousness applying reverse engineering methods by scanning a human brain [3,4].

Indeed, such endeavors are now widely discussed within the robotic research community and equally among the plebian communities ever since Minsky's work detailing about the modeling of neuronal behavior using electronic circuits conceived as a learning system that he termed Perceptron, gained much appreciation, and following Isaac Asimov's sci-fi classic *The Bicentennial Man*. The domain related to the cognitive theory of consciousness, however, is rich with novel concepts related to the systems of thought, intelligence and emotion in robots, an issue long considered challenging. To design and program semantics for intentional systems other than human is a tedious task, as Dennett has elucidated in his paper [1,5-8].

Furthermore, the mental evolution of machines as like androids *per se*, would demand thoughtful consideration of the organizational blueprint issues of such artificial mental systems, for like Mind Simulators, Simulatron and Robogenics-that is, robotic intelligence. However, the network of intelligence in machines is not enough to embody conscious thought processes in robots, for such venture demand models that would likely define artificial consciousness at the first thought, and then deal with the design and embodiment issues of such a phenomenon in machines subsequently. The problem would still remain as a prime issue of coupling virtual realism with the real environment in which robots would exist and function. Questions arise as of what would be the nature and content of the artificial minds, and how to define mental states in machines. Would they be mentally equal or unique to human minds? And further, what should be the guiding principles of artificial minds?

Though we already have in practice some powerful automated search techniques that enable machines somewhat to 'think' without compromising in speed, such as intelligent search query algorithms which learns and memorizes customized search patterns on the web, they are smart but not conscious. Yet, the question would arise even if such computers become as complex as human brain, should we consider them conscious- or even intelligent? What is our innate consciousness lacking which is tempting us to go for the artificial ones? Where is the need and why is such a need? Nevertheless, anything before such grand endeavors, we would first require to understand the existential states of the human mind; the form of existence in the physical states of mental processes and emotions that is preceded by consciousness.

One cannot endeavor to create a mind without an existential objective brain (in whatever form or structure) and then consciousness devoid of a subjective (coding via algorithms) mental process without supplementing thinking to such conscious states to let the system assume and understand its very own existence. Considering that a body (organization of systems) is a necessary clause for embodiment to support the machineries of cognition- the brain, which in sequence, is a supplement to support the mind; that, in essence, is a seat of consciousness to enable creative autonomous thinking. Yet, it is difficult to ascribe if our own consciousness is a purely virtual mirror of the inner world created inside the brain which establish direct contact with the external (real) environment. This issue was raised by Baldwin on his idea of circular reaction between the individual and the environment [9].

Even, theory on the assembly of neurons was based on a prior work done by Lorente de No's description of the interactions of neurons [1,10,11]. It is thus imperative to consider that those artificial entities we venture to design would then be governed by their 'autonomous'- *free will* and those wishful conscious endeavors which might stem from the fact that the *efficacy* of a free will in human beings is well established and therefore, embedding such structural identities that would likely generate "conscious free will" in robots would likely remain much *less* questionable. Conceiving such a system *as a whole* that would assign any kind of causal power over their constituent elements as 'free will' may empower them with somato-semantics of intrinsic intentionality wherein they would be able to understand contexts and be able to *'choose'* from those the right contextual information at a definite moment of time so as to aid their full coupling with the environment. That the current AI based robots lack intrinsic intentionality and is devoid of semantics also raises similar inquiry of whether is it possible for the physical world to posses any such semantics? As such, designing machines capable of modifying their teleological structures to pursue new goals by means of pairing with their environment would attach superior flexibility in understanding their immediate surroundings. A greater degree of coupling would ensure that they would learn to *think* under such spatial- temporal contexts which would help generate their behavioral repertoires as like any other conscious entities.

The debate remains much more noisy in other contexts of replicating human conscious processes; at least, that requires clarifications and refinements of our concept of consciousness; to further define whether animals are self-conscious (Griffin, 2001) the complexity arising from the models of animal and human behavior as well, due to the confusing nature of biological mental processes; of the volatile nature of our emotions; of the ubiquitous nature of origin of human sentiments; and about enriching empirical theories that readily define such paradigms of human mind beyond cluster concepts. Whether the brain mechanisms of conscious awareness is a shared phenomenon for both animals and human beings is

as well debatable, since, animals, particularly the primates share similar brain anatomy as humans [12,13].

In such parlance, this paper discusses these concepts in a much more open manner and provides constructive arguments on the two below mentioned delineated meta- arguments. In the foreground, I provide some structural axiomatic orientations to draw upon such issues confronting architectural design of synthetic minds embedding artificial consciousness that would possess human-like qualities i.e., emotion, social instinct, self- awareness and unique personality traits which I call "mental uniqueness" in machines. Whilst at the background, I discuss about some unresolvable disputes concerning the possibility of conceiving an artificial entity by laying more stress on how design approach can play a significant part. In this attempt, I deem it relevant to touch upon few basic concepts of the neural correlates of consciousness and sensory awareness that would help define such artificial behavior in conscious robots.

1.1. The Definition of Consciousness: A Surreal Problem

The definition of Consciousness is affluent in the literature of the mind. However, the knowledge about the evolution of and the true essence of consciousness are full of intricacies, as much as to comprehend its concept in objective sense, as well, the problem of how to define consciousness. Whether one should take the path of dualism, materialism, experience or qualia, or whether one should approach from a reductionist or empirical cognitive neuroscience point of view, or from the viewpoint of functionalist computational programming, the whole approach generates much metaphysical heterogeneity. In similar spirit, Tulving Endel perhaps quite correctly stated in his paper that human consciousness is the greatest mystery of all the mysteries of nature. Sri Aurobindo, the Indian Philosopher, writer, scholar and a missionary of peace who derived his concept of consciousness from the Vedic ontology, considered consciousness as omnipotent and omnipresent; a similar view of Panpsychism is endorsed by David Chalmers (1996) who suggests that consciousness is everywhere. However, Dennett (1991) proposed that subjective consciousness does not exist, even-though, he described three aspects of phenomena in his phenomenological garden (Dennett, 1992); experiences of the external world, experiences of the internal world and experiences of emotion. This feud between extremes of ideas has indeed complicated such metaphysical heterogeneity in defining consciousness in general [14].

This however, invariably leads to the mind-body problem. In classical dualist western tradition, Plato and Descartes bifurcates the universe into materialistic and mentalistic attributes of nature. It was Descartes as a thinker who was responsible for the theoretical duality of the mind, insofar that if awareness be considered as a matter of organization of systems of representation, then conscious awareness is a matter of brain activity wherein the approach to define consciousness should arise from the viewpoint of a materialist and mentalist. Back in the nineteenth century, the British Philosopher John Locke defined consciousness as 'the perception of what passes in a man's own mind'. George Miller in 1962 wrote 'Consciousness is a word worn smooth by a million tongues' [15]. Ned Block proposed a distinction between two types of consciousness that he called phenomenal (P- consciousness) and access (A-consciousness). The notion of consciousness divided the philosophy of the subject into distinct western and eastern thoughts, as also, unified both to share the discourses presented in eastern and western philosophy of the mind and matter. Though consciousness the definition of which I propose as a *'phenomenon of self-awareness through the conception of the nature of reality'*, it becomes factually complex to recognize without such diversions into philosophical debates which however tends to generate a great many metaphorical inferences [1,7,15]. This fallacy is well acknowledged by the pedagogical society, and that often presents as a paradox to many a theorist of the mental sciences of cognition and brainpower. Machine, as defined by Steven Harnad, is a dynamical system governed by causality. He states that in such similar sense, we too are machines, but the point is that we human beings are indeed machine programmed by our genes. Our genetic constituents determine our nature of existence, interaction with the environment. The reader may wish to refer to an interesting article written by Max Velmans which deals with the problem of definition; of how to define or how not to define consciousness. Indeed, consciousness is the power of the mind which is seated in the brain, and the computational metaphor of AI with its philosophical underpinnings regarding explanation of the behaviors elicited by the human brain, poses two distinct problems for the designers of artificial intelligence. These are in the tune of whether to accept or disregard the mental phenomenon of cognition and intelligence as essentially a physical process or consider it as something etherealistic non-entity, to which, I oppose of intelligence being ethereal. The text box considers such a debate in some details below.

Donald Griffin's (2001) is of the view that the phenomenon of consciousness is not a mammalian monopoly. According to his book, he contends that consciousness even exists in lower forms of organisms. I would like to extend this theory forward to assume that it exists in those without brains, and in those with brains, yet, it is often subdued in others having well-developed brains. Second thing is that, if consciousness is something like being aware of one's own awareness, then I would say that it is both continuum, and a discrete process. In such parlance, we would require to dissociate the term "behavior" from "consciousness", since this generates too much ambiguity. The fact is; behavior is something considered a performance or an act, action or conduct which indeed originates in conscious entities. But it (behavior) can also originate in entities which do not have any consciousness at all- where, such conduct is just but discrete, random. Reciprocally, consciousness can give rise to complex behavior as we know, or it can generate no behavior at all-only then one can say that such a phenomenon being "Panpsychious". For a more meaningful discussion on theoretical behaviorism, one can refer to Harnad [16]. Meaning that the physical or the metaphysical state of consciousness is present universally, and not just in warm blooded mammals or primates. Now if consciousness is a universal reality, then even the simplest of the organisms that have simplest of the nervous systems, or

no nervous system at all, are conscious!!! But there is a serious caveat. If we must consider consciousness as a process inside the brain seated in the mind utilizing the memories of experience and skills, then it must be accompanied by some level of intelligence to be cognizant, some processes of thought. And that's true enough; lower animals experience conscious thinking without words and languages. They also think, like a dog which thinks about his good meal, or a cat about her rat. We know they think, yet, the problem is, as Griffin (2001) has stated about, how they think. So animals think without representing such in linguistic format, but we do.

Neither do animals apply logic as we humans do. In essence, they cannot program any objective events, or say, causality; yet, they have phenomenal contents of emotion; pain, pleasure, fear, anger and love. Hence, as much as consciousness now elicits behavior, thinking is as well a conscious behavior. One cannot think without being in consciousness- in such reverence, it is a monopoly of the mammals (See Griffin, 2001). Coming to the Penrose-Gödel theorem, it may be considered a paradigm- a quantitative measure of the content of consciousness- contrary to 'Qualia', which is its qualitative attribution. We, as human beings, comprehend the nature of reality by using relationship between facts with reasoning, whilst animals attempt to understand relationship without much reasoning. As Harnad proposed that consciousness as an epiphenomenon of neural functioning, it is of certain to generate philosophical deliberations, even by considering that animals are conscious without being aware of it. And so, inanimate objects- are very much conscious without being aware of it, going by the phenomenon of Panpsychism (Strawson), which is however, not a well-documented scientific phenomenon [1].

This delineates the human mental process into its two sub-processes; consciousness and awareness. Steven Harnad's proposal of this phenomenon of consciousness being an emergent materialism thus cannot be refuted, since; it is the result of the neural functioning, by neural correlates, through passage of some physical states. Hence, it is indeed some Quantum state. But it must be remembered that dynamical states and properties are not just the monopoly of the mind and brain- it exists in almost everything. Hence is the origin of such a phenomenon of Panpsychism. I think Dennett refutes this claim, while Chalmers endorse this view. So, it creates much complexity to formulate just "one" definition of consciousness, unless we consider the dualistic view.

The real problem is that we require to debate whether consciousness is or is not confined to mammals alone, or is it a universal phenomenon to be defined by Quantum Mechanical Field [17]. At first, things appear to be rather hazy when one puts up the theory of cognitive dissonance. This pertains to the discreteness of consciousness being a process without cognition, where cognition is defined as knowledge gained from information processing.

One needs to be some cognitive entity to be aware of one's existence in self. For like in even honeybees which may be termed consciousness, far down the line of invertebrates, since they are able to employ symbolic gestures to navigate and communicate with their sisters [12]. How can one refute such a claim that they are incognizant and unaware? As also, it is very difficult to disprove their conscious behavior when we humans often get disoriented from time and place, and being conscious enough, often lose directions in life, say for example, in a new city when we occasionally lose our way back to hotel. Honeybees seldom lose their navigational instincts. The fact is that their cognitive functions are just proportional to their whole system which is small, yet they process information to some extent.

Consciousness in terms of quantum phenomena, may be considered as various states of energy, supported by energy derived from the burning of glucose and oxygen in the brain wherein, if and only if awareness is preceded by consciousness (as a *priori*), the power which generates another power-awareness, (while the truth of the reciprocality is considered practical as well) and which is by itself the power of the mind. It should be kept in mind that the process of attention is energy dependent, and require brain metabolic process to generate enough energy to support conscious awareness. It is often the energy that precedes reality, and it is the nature of reality that is preceded by some actions which require energy, force etc. So it is not entirely true that awareness precedes consciousness. *"I am conscious so you are,"* but I am not *"aware"* of many things which you are, and vice versa, since I (you) have not processed those information (am not in similar states of cognition) which require energy (burning calories) to be fully aware of such things in existence, which doesn't mean that those stuffs don't exist at all. Here, consciousness precedes awareness. So, consciousness is indeed an epiphenomenon of neural functioning, and awareness just a phenomenon of such a functioning. Consciousness herein is "general", whereas awareness is a "variety". The other way around is possible I presume. Being "unaware" is ignorance which gives rise to assumptions, and it is where scientific inquiry often begins. Considering from the viewpoint of whether such subjectivity is irrational and objectivity is rational, even if such a subjective state of consciousness is an activity born out of the CNS, then it is indeed but a part of the physical universe. It is possible to put parts together to make a whole, or slice the whole into some recognized parts, to make it look like objective awareness, which is rational.

The origin of subjective sense of feeling is indeed a *priori* awareness, even if such a minute organism is not conscious. Since, this awareness of the real dynamical properties of the environment enable such organisms to adapt to environmental challenges, in where, it can be said that awareness precedes consciousness. In such a terminology, awareness being a *priori*, is a form-a state supported by energy, the energy having *entropy*. Herein, there is but no consciousness, yet awareness without cognition. It is the qualitative content of the environment that enables to alter the quantitative contents of the organism in question. So, Qualia affects Quantum field states, that state which is preordained, and universal, wherein Qualia is just phenomenal and so it is evolving, as well devolving.

It is not ethereal, but abstract object, just as Quantum consciousness as a Quantum field phenomenon is not, however, insubstantial, a part of every mind existing in space and time [18,19]. The cognitive neuroscience of awareness (Bruce G Charlton) states that consciousness is a slowly emergent phenomenon- babies are born without it and slowly develop it by the passing years (Piagetian theory, yet they are aware of thirst, hunger and pain, which is universal. Here again, subjective awareness precedes objective consciousness, and awareness is "general", whereas, consciousness is a- "variety". Yet, one can generate behavior by just cognitive processing as in simple robots without the robots being in awareness. There is a causal property behind such a phenomenon as of, why we know things without being just knowing about it? Knowing, as well perception is essential, but why? Is it just to be aware of such things in existence? Complex computational tasks like machine vision occur without being aware of it. If such a task is tied to awareness (how?), it would invariably be conscious.

Yet, the machines just mimes, just proceeds through some routine tasks, senses its environment, inputs information, processes those inputs, and generates some behavior, all unaware of the pure nature of causality-the reality [20]. Nevertheless, the problem with the mysteries of the mind is that we may accept or agree at some point only to disagree from that point onward. While tracing the phenomenological origin of consciousness in man, comprehending the nature of reality is what that appears to be the phenomenal occurrence of experience behind such a mechanism of conscious thought process in human. Whether the origin of consciousness be defined in terms of the passage of neural activity or the interplay between the correlates of mental functions between the internal elements of the neurons with the external objects of the environment, its epistemological representation, however, relates to the linking of the sensory inputs to motor output by the human acts of intelligence utilizing our own elements of memory [43, 47, 50]. To provide a more inductive approach to the understanding of human consciousness, we may often need to retrace our own origin of evolution back in time. Yet, the reality is that, to 'describe' natural human consciousness is much more difficult since it cannot be comprehended readily, rather, observed 'subjectively', although much easier to be 'described' if it is felt objectively as a 'self'.

However, an objective feeling of consciousness is not enough to understand its embodiment and its essence if that is required programming, and then embedding in artificial state in intelligent creatures. True enough, a mere subjective observation of consciousness is inadequate either to comprehend its origin or to decipher its organizing principles from a neural network. The human network of consciousness is thus, an ever elusive phenomenon that has haunted both the philosophers of the mind and the theorists of the matter alike. Yet, one cannot just fly away from the problem that is at the heart of such an endeavor to design and embed artificial entities with synthetic consciousness, to mimic our own so that those future creations would be indistinguishable from us in mind, need not be in matter. So, it's indeed, a matter of the mind. And it would much determine our attempt to model consciousness artificially to decipher its true essence, and hence it's programming as a *nonentity* by algorithms of conscious thought. By *nonentity* I do not mean it insubstantial- rather, something *ethereal* which have a very delicate existence. Only then, can we succeed in embedding artificial entities with consciousness in processed format.

1.2. Our Grandest Endeavor: Truly Artificial

Current technology heralds such excellent use of robots that make good models of biological behavior, simulating a myriad of behavioral aspects of animal and human sensory-motor actions. Besides, equipped with state-of-art algorithms, robots are being used for other intelligent purposes to serve human quest for knowledge and analysis of our dynamic real environments. So far, these are limited to such applications that require human interference, i.e., artificial entities are however, not able to act autonomously since they lack the power of higher level abstraction, reasoning and thinking. Nevertheless, our quest for intelligence within, and beyond our conscious minds have led us to re-examine the epistemological objectives of machine consciousness, besides, foreseeing about the embodiment of conscious experience in machines that would define the behavior of artificial entities in so called artificial intelligent systems of robots and humanoid-like simulated species we call *androids*. If consciousness be ever considered to be a physical phenomenon having practical effects on behavior, then, modeling consciousness in machines in such endeavor to build intelligent robots that would match or even outsmart human minds in thought and action would lead us to two possible counterarguments;

a.To deny the possibility of such machine consciousness
b.To understand the existential phenomenology of artificial consciousness at the foremost

The two arguments hence by reciprocity, are counterintuitive as well, self-imposing. To deny the possibility of machine consciousness typically would deny the very possibility of human consciousness that would otherwise, help define those artifacts of the mental philosophy of machines. The functional view of the mind in machines is not unthought- of; rather, Wallach and Allen few years back conceived such ideas of artificial conscious minds in entities other than humans [21,22]. This exploration is not just about embedding human blue- print of consciousness in machines, but rather, elevation of such integrated systems into the higher dimensions of artificial intellectuality the embodiment in which, human minds operate. Hence, to conceive such synthetic creation of artificial intellectuality and then to impart them with some form of consciousness remarkably similar to humans would lead us back to ask ourselves; Where do *'thinking'* stem from in AI (Chella, Manzotti, Tagliasco, Manzotti)? And so equivocally, where do *'thought'* stem from in the human brain? If the latter phenomenon is well understood to the extent that it provides us with an opportunity to decipher those natural design secrets, it might indeed help us to fabricate machine thinking networks to give it a mind and then, impart it with consciousness in principal, which is however, based on the theory of embodied cognition. Insofar, as the current methods of intelligent thinking in machines that stems from the advancement of artificial intelligence

supported on rule-based massive parallel processing equipped with heuristic and algorithmic programming of artificial neural networks (ANN), that eventually dictate behavior of such AI agents, may indeed require us to explore further beyond such generic methods of programming which would help design minds of the future machines. That would in general and in specific, pose as a challenge; of under what conditions robots would be conscious, if they are deemed to be such at all? The physical basis of implementation of self-awareness by means of human psychological relevance beyond sheer simulation to elicit explicit behavioral repertoires autonomous to human is much contentious, as much as concerning those models and frameworks of whether such models be used as tools or to hypothesize robotic sense of intellectuality and mindful awareness.

1.3. The Debate Goes on: Where shall we go from here?

The foundational origin of the mind and the ontology of conscious thought are thus highly debatable amongst the practitioners of evolutionary psychology and cognitive scientists. It's not if we fail to derive the ontology, we must succeed in delineating the course of evolution of the conscious thought process. As Jean M. Mandler has contented in his paper that psychologist often undermine the concept of meaning and how it arises in the human mind. It should be noted that although our mind is situated inside our brain, the working of the mind is different from that of the brain functions. In such that, the origin of conscious thought cannot be some abrupt phenomenon, but a slow evolving process the foundations of which are laid as groundwork much during the infancy. Tracing the origin and evolution of conscious thought being some gradual process (Cowley), and not an *abruptly* emergent process akin to the evolution of artificial intelligence although the evolution of AI have some history, the ontological development in such analogy starts when a baby grows from infancy into childhood, and then to pre-adolescent where, the concept formation, assignment of meanings to objects and contextual understanding evolve consecutively [23].

According to the Piagetian theory on the foundations of the mind, it all begins with the evolutions of the baby's concept of objects, which is, once the baby starts to assign and interpret meanings. It should be born in mind that even babies do make decisions, since any consciously generated response is decision-making. I *say consciously generated*, in such sense that the baby is consciously *'aware'* of his or her existence through her behavioral dispositions of the essence of feeling, i.e., of pain, hunger and thirst, affection, joy and cheerfulness. A baby cries more often than a grown up child, the child cries more often than a full grown adult, and we cry only when that is rationally demanding. A baby responds to multiple stimuli, of course in varied capacity. And to such external stimulus, the baby responds in terms of her predisposition of behavioral repertoires which are inherent or inborn, or gradually evolving. The difference from an adult in such parlor is that, babies are highly capacity constraint in processing information, since, the pure essence of the interpretation of the meaning and assignment of meaning to events and objects are less developed than those of adults. The real difference lie beneath such parameters which characterize underlying variables based on which babies and adults respond differently to stimuli- or make decisions. The capacity to process information is less developed in infants, so the models which integrate information in the brain are ill-conceived by that time.

Indeed, the constraints of limited time, information and computational capacities of our mind limit our further understanding of natural principles which often induce us to stop seeking for further information and make a generalized response. So, we act or respond bounded by rational choices and consequently have been the origin of the concept of bounded rationality [24]. Such constraints in computational capacities and the limited amount of information that we are able to process at a given time is as much dependent on the nature of *imperfect* information which give rise to uncertainty. The questions remain as of, how can an artificial mind deal with all these issues?

2. The Matters of the Mind: Design Concepts

• Consciousness in Artificial form: The Capacity-Design Paradox

The evolution of human consciousness is much more difficult to comprehend than the artificial evolution of consciousness in synthetic agents that we call machine consciousness or artificial consciousness. Consciousness in such paradigm accounts to the phenomenon of self-awareness as well the conception of the nature of reality. The conception of reality stems from the capacity of the mind to experience a range of stimuli that our environment presents. Considering the fact that the human capacity to experience is infinite relative to artificial agents, since the human mind is capable of experiencing an extraordinary range of things and events, yet, the artificial entities can be designed to extend their range of experiential capacity to some great degree. The question is, by how, or what mechanisms and design approach will it be possible to enable artificial agents to experience the nature of reality in a much similar comportment as human beings? The design approach is significantly important since our brain is uniquely structured the functional architecture of which is still fully unresolved. If we observe intimately and assign the real cause behind such postulation, we find that one of the several common factors that we can figure out is- the *design* approach. We can well increase the capacity of artificial entities to experience the dynamic world in a more flexible manner. The common formula that I have come up with herein with is;

Experiential Capacity (EC) =design(D) * (perception(P) + sensation(S)) + e

Wherein, capacity to perceive and sense the reality can be substantially improved by altering the hardwired design model of the machine in question. The variable 'e' in the above equation denotes error term, in terms of errors in artificial experiences. Innovation in the design concept should be able to increase the functional parameters, perception and sensation that would in essence increase the overall capacity of the artificial entity to experience more varied amounts of objects in the environment. However, there are limits to design approach. Hence, in our attempt to understand the true nature of human consciousness,

we may at first require to deconstruct as well, comprehend what unconsciousness is, in order to shape artificial consciousness in machines.

Since consciousness and unconsciousness are the two attributes of the same mind, to transform a machine which is in reality 'unconscious' to one such 'conscious' entity that would elicit the natural cognitive mental processes of the mind, a deconstructivist design approach might be essential. If we are to embody machines with the perceptual phenomenon of the representation of experience, it is essential that one takes into consideration that to be consciously creative in one's own activity, one is required to perceive the experience of the nature of reality. Yet, it is apparent that we are stuck somewhere. Although the substrates of the matter and the structure of the DNA are now well understood, the architecture and the origin of a conscious mind still remain much unknown. Mysteries regarding the epistemological foundations of the mind and the origin of human *conscious thought* are seated on the phenomenological episodes of mental processes that we often fail to comprehend. This invariably leads us to various metaphorical inferences which divert us into philosophical debates since we cannot afford to build theories on just speculative inferences and then let the logic do the rest. In that way, logic may fail invariably. Understanding the pure basis of the logic that builds on the underlying principles is vital. As also, thoughtful consideration of the basis of the logic is important to minimize logical errors in dealing with uncertainty. It is often debated that pure logic without its accompanied variations, is not the best way to deal with uncertainty.

This is certain in the case of designing artificial intelligent systems that demand accommodative adaptation in their underlying logical foundations which however led to the birth of fuzzy logic systems and other adaptive variations that softens the logic behind such theories. The problem is not confined to the external physical design, but with modeling of internal elements that would deliberate action, intention (Cowley) and goal construction in androids-or robots which would enable them to think like humans. And the problem is more concerned with the issue of whether consciousness is programmable by software. As Rodney Brooks mentioned in his book, to date, we have nothing that sort of a robot anything like a human physiology [22,25]. They are all components of steel, silicon and plastics [26].

• Deconstructivist Design Approach: The Blueprint

My idea on a posteriori deconstructivist design approach stems from the prior ideas presented by Hebbs, Piaget's, Sokolov's unification theories first constructed, and again, from Harnad's cons reconstituted from a formal framework that propose constructivist approach to the design of mental phenomenon originating from biophysical and biochemical observable acts. As Cunningham has pointed out that modeling of artificial intelligence is determined much on its ontological organization and development, which transcends to the molecular and atomic level of understanding of the organizational structure of the natural machine of intelligence-our brain. Here, I propose a divertive unification of a model to rationalize our understanding on the conceptual origin of mind, the mental processes, and in certain, consciousness [11,28]. If mind is considered as the epiphenomenon of neural network and neural transmission, then consciousness can be proposed as a meta-phenomenon of the mind [1,20,27]. Yet again, I would not attempt to divulge in such metaphorical assumption that would drag us back into philosophical debate. Instead, what I propose, is to deconstruct the mental processes associated with consciousness into two distinct categorizations based on systematic reorganization of the brain into i) functional comportment, and ii) structural comportment. This endeavor, I believe, would make the design approach less formidable to consider questions of thought regarding the design of consciousness itself. The first comportment-functional, where, I would lay more stress on the organization of memory and memory related to consciousness while in the second-structural, would likely deal with unification theories encompassing Hebbs, Piaget's, Sokolov's along with the more recent theories of organization and interplay of biophysical and synaptic activities related to the design of an artificial mind [1,20,27]. The goal is, first to understand a framework to delineate the essence of consciousness, and then to consider whether consciousness can be programmable by algorithms. A similar view was reflected by Michael Gazzaniga on the ontological account of phenomenal consciousness where he expressed his assumption, a view endorsed and uttered in great enthusiasm even by Ray Kurzweil. Michael Gazzaniga writes,

"At some point in the future, cognitive neuroscience will be able to describe the algorithms that drive structural neural elements into physiological activity that results in perception, cognition and perhaps even consciousness".

Yet in quiescent cradle, I do present my skepticism, even in diminutive sense of doubt, of whether computational approaches alone inclusive of software and algorithms would really be enough to explain or suffice as genuine explanations of consciousness [17].

When considering that if mind or mental process is an epiphenomenon, I would ask then, where is the seat of the mind? Is consciousness seated inside the mind? What is a higher order thought? The last one, higher order thought stems from the idea proposed by David Rosenthal. Rosenthal's philosophical position on human consciousness perhaps laid the foundation of thought as perception, as well, evident from his theory of unconscious higher order thought, since, consciousness and unconsciousness, the two attributes of a functional mind is situated within the machineries of thought-the brain. This gives enough evidence to the mental phenomenon playing role in thought, but not enough still yet on the question of awareness. This also leaves a ground to persuade on how we comprehend semantics and syntax of language [11].

The second comportment would lead us to question on the very nature of consciousness that we endeavor to embody in machines. What kind of consciousness a machine should have? What are the different types of consciousness? While Dennett's view that software could someday explain awareness in machines as well

consciousness in artificial agents, I would ask, what would be the nature of such consciousness. Undoubtedly, I am throwing this question to Ray Kurzweil (with apology) subtlety since there still remain furious debate on explaining the true essence of human consciousness, let aside the artificial one. Whether it was Roger Penrose's appeals to Godel's theorem to explain consciousness in terms of quantum mechanics, or by contemporary scientist's (Dennett's) endeavor to define the same in terms of programming network in virtual domain, or memory, the final appeal must appeal to all for one common explanation-the true essence of consciousness [29].

If we are not able to agree upon one common agenda to define consciousness, there would arise multiple versions of consciousness operating on different machines each with its own intrinsic attribute and essence. That would be, in actual fact, problematic, in a sense, would let us just master the art of substituting one mystery for yet another. Hence in order to characterize the mental philosophy of machines, I would take this endeavor to characterize the two comportments in terms of functional and structural analogy. On this regard, I assume it is far better to deconstruct each of the comportments into their respective topology. To be able to define consciousness in cognitive cellular network, it is important to deconstruct functional topology into their respective sub networks. To define in terms of algorithmic sense, it is important to conceptualize the organization of the overall system and integration of components that would determine the architecture of the software so to avoid design problems. Coding consciousness in machines is a tedious job since such a complex system does generally demand complexity in software architecture.

The purpose of the software must match the purpose of the hardware. So yet again, it's the design architecture that requires being specific (for what purpose?) The question is, whether software designed based on the foundations of behavior will elicit similar behavior-the program that will need to run the machine to elicit desired behavior must have some foundational basis. This would imply inputs from the external environment and processing them inside to elicit some desired behavior of the machine. As I have mentioned in the design approach, to give a relook, both perception and sensation are essential inputs to a system. Perception is something about affect-neutral representation of events happening out *there*, whilst sensation is something happing in *here*. Both require the systems of memory to record such experiences which is but the integration of both happening out *there* and *here*. The human mind is capable of experiencing an extraordinarily infinite range of things and events. So, is the human capacity to experience ever boundless? And so must be for human memory? I am not eager to celebrate the validity of my approach, rather, honed in to provide some conceptual paradigms that might address the problem in a different manner. When we say that episodic memory is conscious but procedural is not, we will require first to classify the whole architecture of the memory system that would capture such varieties in experiences. Hence, a simple taxonomy of memory proposed by Miyashita is mentioned herein which I derive (courtesy) from his schematic representation [30].

2.1. The Types of Memory Systems

Human biomemory can be classified into Short-term memory (STM), retained for a very short time and the long-term-memory (LTM). The LTM consists of *explicit* (declarative) and *implicit* (non-declarative) memory. Explicit (declarative) memory is classified into episodic (events) and semantic (facts), while implicit (non-declarative) memory is further classified into procedural which relate to skills and conditioning. The other implicit memory type is described as preceptual representation. Now we can easily comprehend why episodic memory is conscious but procedural is not. But this is not enough to solve the problem. For an artificial system to gain consciousness, just hardwiring the machine and putting some OS (operating system) are not enough. While human evolution has gained experience through its evolution in time, it is not possible for the machines telescoping archaic events by squeezing back in time. Storage of chronological structures as artificial experiences would thus require the systems memory approach denoted above that would in part solve the problem of the evolution of experiences in machines. In such parlance, the adaptive capacity of the algorithm in coding of coherent sequences of events as schema would power the machine to master both episodic and procedural memory, and hence, the objective nature of experience. For the subjective nature of experience, the design approach would enable for such accommodation of subjective sensitivities in machines where, the problem of perception being already dealt with, the coding of episodic memory may lead to acknowledge awareness in some form. As Nicholas Humphrey has stated, perception is more primitive than sensation. Hence, perception in machines should precede subjective sensation of experience, that is, perception of the nature of the dynamic reality of its environment is called in first before objective experience. That would, I presuppose, allow the machine to gain both syntactical and semantic skills development [31].

• The Problem of Realizing the Real Nature of Reality:

There is one philosophical minefield ready for explosion- the nature of reality and comprehending the realization of that reality. The real paradox is that, when that reality is in doubt, we say it is beyond scientific inquiry and do not deter from branding it as metaphysical. However, when that very reality is well understood, we call that metaphysical characterization a scientific theory. Hence, the fine thread between metaphysics, philosophy and science is really very thin.

What makes an object or event memorable is its quality, and hence we may define such subjective experience of the particular quality being experienced as "qualia", as Dennett himself wrote in one of his chapter (Dennett, 1988), *"the qualitative or phenomenal features of sense experience[s], in virtue of having which they resemble and differ from each other, qualitatively, in the ways they do."* and to which he holds strong without denying it either. As I remember once I nearly framed a paradox where the problem arose, *'we cannot endeavor to move without software and programming into the domain beyond software and programming'.* The real problem of conscious experience is that, one must comprehend the reality of the existence of such

states in real, not illusory. When I say memory with experienced remembering with or without perception, it may be acceptable, but when I say that memories of experience without sensation, it may call for explicit inspection (if I am mistaken). So, there is hot ground for such debate of what would be the nature of machine perception-imageless or imaginative? It is pertinent here to quote that on the philosophical theories of awareness, Daniel Dennett much disliked the *folk psychology terminology.* His contention of perception being illusory, to which I extend my explicit objection. Objection on the fair ground that he does mention about perception without sensing is acceptable, but perception as an illusion makes the mathematics of experienced awareness more complex, since, experiencing perception is important for the mind to couple with the environment, as of, when I say that perception is something which is happening out *there*! What if we fail to perceive the dynamic reality of our surroundings (Milgram,et al; 1994) how can we expect machines to be consciously aware of something which is happening out there in real? On this respect indeed, differentiation of *sensation* from *perception* is essential [13,32].

If consciousness is a necessary condition for thought and abstraction the capacity to construct, we cannot construct thought without being aware of the nature of the quality of reality [39, 44]. Take for example ripples forming in water. Ripples evolve from the water, and they devolve in water, but it is a creation of a process which is not illusory, but a causation of which may be entirely different from the constitutional contents of water. The cause must be there presented to be as reality there to have ripples else, there would never be any effect so called ripples without a formal cause, and so the water shall remain calm forever! This is to reason to generalize individual representation of reality, or *qualia,* using signs to avoid differentiated perception-for universal acceptance of reality through 'common' signs of realization of the reality.

Nobody inscribes a manuscript in his or her dream. This dream factor would make sensing without perception perhaps possible, since sensing is experiencing of something which is happening in *inside*. Well though, I am not hypothetical to make myself pleased enough and so I contented with Dennett's view about perception of being illusory, a fact which can be extended by asking whether abstract objects are real objects in existence. Howsoever, nature of reality contend that representation allow reference. So, I place a query herein, how does language helps to abstract and selectively represent? And how does this relate to pre, peri, and post ontological growth of consciousness- since birth precedes growth and there is no growth without anything being born. This helps us to understand that we may never be able to acknowledge the reality if such reality is not born at all- or remain illusory according to Dennett's philosophy. Or is there another way around of which shall I acknowledge my humble ignorance in advance. To sum up however, this issue summarizes my theoretical presentation on deconstructing the nature of conscious awareness with respect to formalizing its embodied nature in machines.

3. On the Question of Denial: Concluding Comments

Having being dealt with design approach, let me revert back to the original argument which I proposed in section three, I would like to discuss formally about the ethical issues which remain covered under searing matters of pure design and development of consciousness in artificial forms. The issue concerning ethical validations and future risk to the human race from such endeavors when achieved can be perplexing. I present a minute discussion from one of my own contributions to such a forum discussing these issues publicly, in the social networking site, ResearchGate;

"...Undeniably, I think robots will have those kinds of emotions some day, yet I would like to mention that human emotions are both complex, and confusing. And that's perplexing for machines to emulate those as all inclusive. In essence, as I have mentioned before, design of device, say, even a musical instrument, shape their affects' tone and resonance. And so, designing machines as artificial entities would definitely shape their affects and belief. Things essential for such is to have at our disposal good grounding "values", to remove common errors of ignorance about morality with which, we as humans are afflicted. This, I suppose, then, would really mean something more than just "humanizing" robots. Triggering such human instincts in robots was what Asimov dreamt in his book "The Bicentennial Man" where he wished "if robots are more human than mankind!"

Asimov himself was much skeptical about those laws that he mentioned in his own works, those three laws which were formulated at a point in time- when scientists did not have fountains of wisdom about machine intelligence. So, one may not assume that those laws as finitely absolute, or unconditional, since there is a behavioral component attached to such laws, the behavior of which, evolves into complexity as the time passes by. It's different from the paradox of whether Congress should not try to rewrite the laws of Physics, math and nature, but indeed, natural laws of human psyche are ludicrously solicitous, rather perfunctory. Having been bestowed with such completeness in cognition of

knowledge, one may not be "wise" enough. So, to make robots street-smarts would nevertheless, be synonymous to say that some humans are stupid enough to do things that animals do smartly...!

"Those who control machines control humanity. If such machines are allowed to be autonomous, they might control humanity as well the tools of humanity..."

I find that public debate and opinions regarding such ethical issues are overwhelming, in both social forums, through motion pictures, and within the research community. Development and research must have some ethical considerations, and in this sense when we are endeavoring to built 'true peers of the human mind' in artificial forms, we may definitely put in mind some ethical semantic sense in the form of subconscious 'wisdom'- that I call common sense which is common to all of us, but in varied measure. The ethical consideration arise when we render machines to think for us, and let them decide what is good or bad, without implicating first

what should be the nature of rationally moral behavior that they (AI agents) are going to emulate (ours of course!). The point is if we deny such a possibility of machine consciousness, we would be denying our very own existence. Again, if we allow such a possibility to take shape, who knows, it may endanger our own existence some day. Or do we endeavor to leave behind a legacy of artificial slaves by creating an artificial society where denying freedom to our future bionic agents would tantamount them to the same fate alike Euryclea, the slave whom Odyssey's father Laertes bought and who spent her life in the service of her master, as she had no feeling of her own, no life of her own, but she had only the life and feelings of her master [33].

Throughout the course of our own origin from the mythic culture through mimetic culture into theoretic culture, our evolution have spanned across a vast amount of time-line, from simple tool users to the present day of complex technological and social development. Our centuries of sapient evolution have instilled in us the nature's best ingredients of thought and action. Just as we are able to differentiate between Homo erectus and Homo sapiens, where, the word *erectus* evolved into *sapiens*, which literally means conscious knowledge, if that denote sapient (knowledge) and sapience (conscious awareness) altogether, which means that humans have walked a long way from its evolution, from mythic (upper Paleolithic, Mesolithic and Neolithic societies), through mimetic to theoretic culture of symbolism [34]. Today, Human beings not only have conscious knowledge, but seeking beyond for knowledge about consciousness, that is, sapience sapient and sapient about sapience, and further endeavor to model such consciousness in machines which is in fact, challenging since, machines may have unlimited knowledge, yet they may fail to acknowledge that they really are knowledgeable [11]. For as Colin Renfrew has stated in his paper, monuments are built for remembrance of memories of events where memorials serve the purpose of collective memories, such as the majestic Pyramids which stand for external symbolic representation, in similar tune, perhaps, our creative masterpiece- conscious robots with their artificial minds (and along with their own creative facets) would likely survive as majestic symbolic representations of this modern society powered by our natural minds L [35-50].

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