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Examining Epistemological Relations of Descartes Thinking Mind and Processing in Artificial Intelligence

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Abstract

Whether machines think remains a contemporary question in face rapid science-tech developments. However, developments in humanoid-AI and the increasing human dependency on AI in decision making, generation of contents for defining realities and trust on their consistencies beg the question whether their outputs are still just mechanical. Using critical realism methodology, the study aims at analyzing the operational modes AI and that of Descartes' thinking-thing. The achieved objectives include; examining operational relations between humanoid-AI and Descartes' thinking-self; examining possibilities of characterizing humanoid-AI operations as thinking in its capacities of processing and iteration of billions of information-data; and establishing basis for humanizing humanoid-AI under Descartes' view on what being human entails. The study concludes that thinking is characteristic of processing and what humanoid-AI does to produce results is also processing which is characteristic of thinking. Therefore, processing being characteristic of thinking is a condition to categorize humanoid-AI as Descartes' thinking-thing.

Keywords: *Processing, Thinking mind, Humanoid, Artificial intelligence, Epistemology*

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1. Introduction

René Descartes opined that to be human person is to be able to think and the thing that thinks, thinking-self, can exist independent of the body-Cartesian Dualism (Descartes, 1991). To think, according to him, is to doubt, understand, affirm, deny, willing, unwilling and ability to have sensory perception. These characteristics are for him, judgements emanating from sorting of relationships of mental beliefs/ data by substracting and adding up on coherence and correspondence of the beliefs following a logical thought command. Descartes averred that these operations of thinking-self produce knowledge independent of the extended body, and the body is more of an individuation of the thinking-self from other thinking things. In its function of individuating the self (casing the self) the body provides access for the self to percieve the world just as the mind accesses the

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supernatural through introspection (rationalism). In either introspection or perception, the thinking-self exists independently (Descartes demonstrative theology). In the body's capacity to access the thinking-self to physical world, Descartes located their contact in brain-neural sensory processing in pineal glands, in which case, processing of mental contents/beliefs proceed from external-environment inputs. However, these inputs do not in themselves contain knowledge. It is the thinking-thing that exercises thinking on the inputs (percepts) to produce dependable knowledge. It is in the ability of the thinking thing to exercise this character that it possesses the quality of human being.

Contemporary world has in existence entities that perform actions that are characteristic of sorting miriads of information to affirm or deny their relationships in determining their knowledgeable ability in relation to decision-oriented outputs. These entities in the form of AI and humanoid AI share the human environment in different facets. Microsoft AI (2023) alone has some high AI systems that radically accelerate productivity both in decision making and problem solving. The company's Sales Copilot reduces mundane tasks and focus on closing deals; Security Copilot uncovers and responds to threats faster; GitHub Copilot codes dozens of languages using natural prompts; and Power BI finds answers to challenging data questions. Other companies in other industries especially in health sector are becoming decisive with knowledge gained through thinking processes of AI. Most current AI thinking being, ChatGPT poses greater competitive challenge to human thinking capabilities. These developments reiterates the question whether computers think (Bunge, 1956).

Through critical realism methodology the study examines what knowing and thinking entails for Descartes thinking-thing and humanoid-AI. The method is necessary here given its measurability approach to study of reality, as it examines thinking and processing from materialists, reductionists and environmental perspectives.

2. Literature Review

Some scholars maintain that machines cannot think giving their mechanical qualities. The phrase 'The Turing test' is a machine-learning programme initiated by Turing (1950) to prove that the question of whether machines think is too meaningless to deserve discussion. The phrase refers to some behavioural tests ran on entities that are claimed to possess mind to ascertain their capacity to exhibit intelligence, thought and mind related expressions. As Luis (2024) describes it, '[b]y the design of the experiment, Turing followed Descartes in implying that intelligence is the ability to reason and to communicate by language' (para 18), which only humans are capable of. The test involves an Imitation Game which examines the capacity of machines to mimic human responses under specific conditions. From the test Turing maintains that machines cannot think which is based on certain three major basis. On theological basis and from substance dualist perspective, thinking is a function of separately existing non-material substance which somewhat combines with the body to make a person. This combination is found in the soul created by God, making a human person an Image of God. On superiority basis, Turing maintains that the presence of a thinking machine will disposes man the unique quality of reason and there poses the threat of human beings being dominated by thinking machines. On consciousness basis, Turing argued:

Not until a machine can write a sonnet or compose a concerto because of thoughts and emotions felt, and not by the chance fall of symbols, could we agree that machine equals brain – that is, not only write it but know that it had written it. No mechanism could feel (and not merely artificially signal, an easy contrivance) pleasure at its successes, grief when its valves fuse, be warmed by flattery, be made miserable by its mistakes, be charmed by sex, be angry or depressed when it cannot get what it wants (445-6).

Within consciousness perspective, he argues that machines have human disabilities such as being kind, resourceful, beautiful, friendly, having initiative, sense of humour, telling wrong from right, falling in love and other sentient attractions. There are other arguments such as issues of extra-sensory perceptions and informality of behaviour which Turing raised on the incapacity of machines to think. However, observing the development on machine technologies, the time of Turing's propositions informs his limitations in deeper examination of machines' thinking capacities. But as critical and open minded he were to possibilities of future developments he submits:

I believe that in about fifty years' time it will be possible to programme computers, with a storage capacity of about 10 (Wheeler, 2013), to make them play the imitation game so well that an average

interrogator will not have more than 70% chance of making the right identification after five minutes of questioning. ... I believe that at the end of the century the use of words and general educated opinion will have altered so much that one will be able to speak of machines thinking without expecting to be contradicted (p. 446).

Given recent developments and in line with Turing's expectation, Luis (2024) posits that 'more recent discussions of machine intelligence have tended to take such feats for granted (even though passing the Turing Test is way beyond the capabilities of any existing computer program) and instead have concentrated on whether other human qualities like consciousness and emotion can be ascribed to a (suitably programmed) computer' (para 18).

Closer to the contemporary time of AI, Visintainer (Visintainer, 2002) opines that Descartes discussion on thinking machines is more of a prefiguration of contemporary time of artificial intelligence theory which controversy will tend to put 'micro-world' theories as justification for thinking machines. Micro-world as concept originates from Papert (1980) which entails; "subset of reality or a constructed reality whose structure matches that of a given cognitive mechanism so as to provide an environment where the latter can operate effectively. The concept leads to the project of inventing microworlds so structured as to allow a human learner to exercise particular powerful ideas or intellectual skills." Against micro-world theories Visintainer contends that human capacity to intuit makes it impossible for micro-world varieties to be categorized as thinking machines. For him; "while computers can do some things much better than humans, the success of machines is always limited to one particular micro-world (the world of chess, for example) or other. Whereas humans typically have a wide-ranging ability to perform all sorts of tasks, computers can do only certain particular tasks well, and whereas humans excel in performing tasks in which intuition is required, computers can do no tasks at all where intuition is required" (p. 1). Visintainer's argument against possibility of having a thinking machine was structured on designating human unlimited mental capacity to multi-task and to intuit as what thinking entails. In which case, it's absence in machines and micro-world denies them capacity to think. However, the author criticises Descartes machine theory as itself a framework for artificial intelligence proponents by questioning the essential difference between the mind and body Cartesian philosophy and their implications on reductionism and physicalism philosophies.

While the above discussed philosophers argue that Descartes Cartesian doctrine distinguishes human person from other beings, some philosophers and scientists believe that the doctrine was indeed philosophical foundation on the possible creation of thinking beings (Panovski, 2023; Wheeler, 2013; Curado, 2019). Significantly, Dennett (1998) agrees that AI research is in large measure, philosophy, as it concerns itself with philosophical questions about mind, meaning, reasoning and rationality. But the difference lies on operational interpretations, where philosophy seeks to explain things from thier "general principles." In his view; "Philosophers have been dreaming about AI for centuries. Hobbes and Leibniz, in very different ways, tried to explore the implications of the idea of breaking down the mind into small, ultimately mechanical, operations." Furthermore, he notes that Descartes himself projected same as he conceived that machines can be made to express words and reactions to specific orders. Dennett therefore, argues that the problem is the strive for philosophers to concieve the logical necessity of machines dealing with millions of gears to produce results within seconds. For him, Leibniz and Descartes would have accepted AI as thinking being were they to meet AI, given thier centralization of existence on abstractive thinking and mathematical process, which for them, the two actually remain the backdrop for intelligibility. As Luis (2024) avers, 'it is hardly surprising that Descartes considered there were fundamental differences between people and machines, since the only machines around at the time were either substitutes for human muscle, like the windmill, or highly specialized recording and tabulating machines, like clocks, or cunningly designed dolls that merely simulated the outward appearance and movements of humans.' The views of these scholars are generally based on conceptual analysis of whether machines have capacities to do human thinking or not. This study adds to the concern by examining in real terms what exactly thinking entails, and examining its relationships with humnoid-AI operation system. It does that by examining the sources of knowledge for both humans and humanoid-AI, and then the process of both entities' identification of relationships of beliefs claimed to be knowledge.

3. Study Framework: Teaching and Larning as Mental Programming

Vlasin *et al.* (2019) refer education as the programming of man, and 'programming the living systems is much

more complex than that of the smart machines’ (p. 95). Just like computer system, they referred to human composition as living system. Like smart computers, the living systems integrate all three major components of reality, namely: matter, energy and information. The components are galvanized by genetic codes inside the living system, and the genetic codes ensure the growth of the organism, its reproduction, its development and the management of everyday activity. Through the codes, matter, energy and information collaborate to respond in specific and constructive way to the environment conditions to ensure a stable balance and a concrete evolution towards a good management and integration of the system.

The programming of man is anchored on mental programming which involves three levels, namely; one given by the human nature, another by the culture surrounding the person and the other by personal experience. These three levels are categorized as genetic, cultural and self programming (Figure 1).

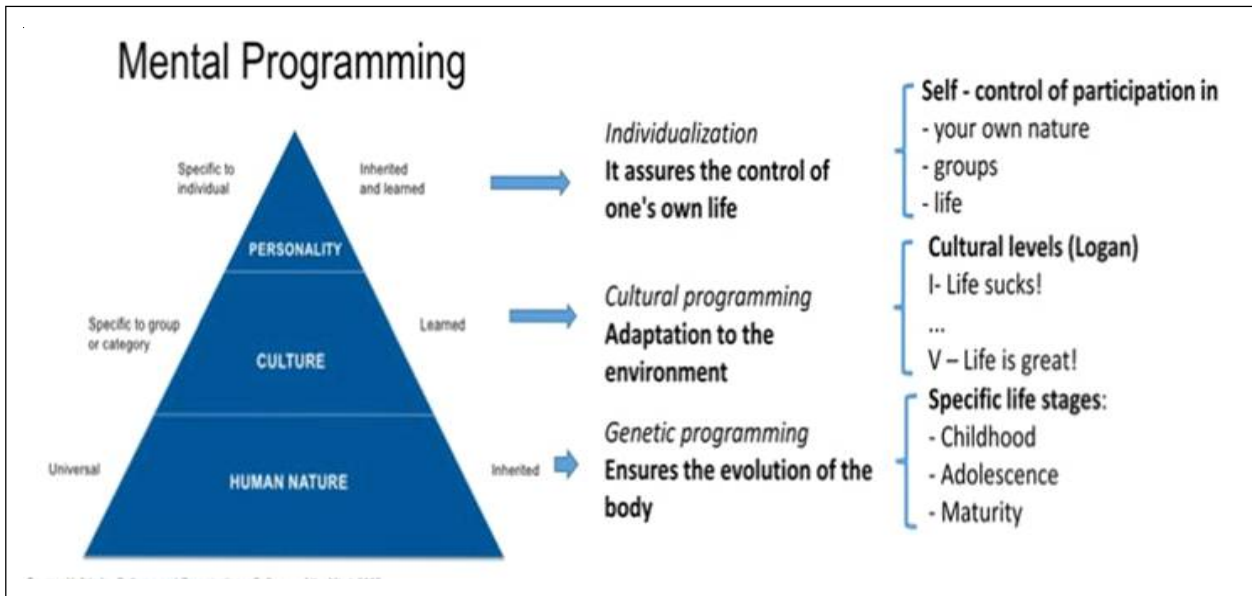


Figure 1: Mental Programming

Source: Vlasin *et al.* (2019)

The skills and abilities that man uses to execute most of the tasks are developed as mental programs, through which different instruments acquired from culture are managed. In Vlasin *et al.* (2019) view, personal programming is successful when a person manages good maturity and

achieve the cultural level, on which life is beautiful, thereby integrating the promptings of culture and human nature. To achieve this, mental software is developed through education and legislative framework to assist handling of individual behaviours in producing specific purposes and rules. For the authors, programming is in most cases understood as rigid and non-flexible and does not reflect in the system of human mental activity. Whereas, man intervenes in the development of fellow man’s thoughts and actions. This is achieved through a systemic approach, where man is characterized as a participant in a great number of systems, from family, community, nation, to very general and complex phenomena of life. In the integrated system, ‘the quality of the participation is determined first of all by the competence connected to the processes’ control and by solving certain tasks in the systems in which the individual is integrated’ (p. 96). Education and regulations seeks to improve the quality of man’s participation in order to gradually and interactively evolve to a state of higher satisfaction. As Vlasin *et al.* (2019) articulate:

The increase of the competence, the improvement of the participation can be achieved in two ways: learning from experience and learning from others. The latter saves more time and effort. This is why the cultures exist and the cultural programming appears, when a person is taught by parents, by school the necessary elements to survive and to pursue a profession. But this powerful programming is very difficult to counter or to integrate through personal programming, to insure a detachment of the person and a real, responsible competence. This is how a person becomes controlled by the impersonal “it” (it is how it is done, believed, thought) (p. 96).

4. Epistemological Relations of Human Mind and Humanoid-AI

4.1. Knowing in Human Mind and Humanoid

The fundamental basis on which the study uses humanoid-AI to examine Descartes' perception of human person is on theory of empirism as a source of knowledge. In any case, it was upon empiricism as source of knowledge that John Locke refuted Descartes rationalism. Locke's critique (Locke, 1689) is based on the view that the mind is born tabular rasa, in which case what the mind identifies, reasons on, and knows are only sourced from experience. Hence, the rejection of the thesis on innate knowledge and ideas as propounded by the rationalists. For the empiricists; "Insofar as we have knowledge in a subject, our knowledge is gained, not only triggered, by our experiences, be they sensorial or reflective. Experience is, thus, our only source of ideas" (Markie and Folescu, 2023) (para 2). For Locke the mind cannot create ideas but only combines ideas imparted from experience:

Let us suppose the mind to be, as we say, a tabula rasa, void of all characters, without any ideas. How comes it to be furnished? Whence comes it by that vast store, which the busy and boundless fancy of man has painted on it, with an almost endless variety? When has it all the materials of reason and knowledge? To this I answer, in one word, from experience (p. 310).

For Locke therefore, the mind grows in knowledge through learning and experience, and thinking activities involve reflection on the combination of ideas generated from experiences. These experiences are accessed to the mind through sensory perception which form the interface between material world and mental conceptions. Thus, the limits of our thinking is dependent on our sensory experience upon and from which complex ideas are formed. Hence, knowledge is 'perception of the connection and agreement, or disagreement and repugnancy, of any of our ideas' (p. 312). It is in this process that human mind acquires three types of knowledge, namely, intuitive, demonstrative and sensitive. Intuitive entails the immediate acceptance or rejection of relationship between ideas from experience (differentiating black from white). For Locke this is the clearest and most certain of knowledge. Demonstrative knowledge entails the application of reason in judging agreement or disagreement of intermediate ideas (demonstrating the existence of God). Sensitive knowledge entails the knowledge of the existence and character of things that are external to human understanding (hotness or coldness of external bodies). This is different from Descartes' view as a rationalist. In examining Locke's approach to demonstrating human knowledge and that of Descartes, Avramides (Avramides, 1996) opines that Locke envisages conditions of non-human animal to possess reason by not bequeating humans with exclusive process of apriori knowledge (p. 37).

Towards process of knowing, the development of vast human knowledge upon which thinking and rationalization take place involves structuring of the mind through constructivism and social learning. Constructivism informs that people learn by experiencing the world and reflecting upon those experiences and through that build their own representations and incorporate new information into their pre-existing knowledge. Social constructivism is a variety of cognitive constructivism but Lev Vygtsky (1978) who propounded social constructivism contends that no learning process can take place without social and environmental determinants. For him learning does not just involve assimilation of new knowledge but necessarily involves cognitive learning originating from social interaction. Thus, learning and knowledge take a growth and development process:

Every function in the child's cultural development appears twice: first, on the social level and, later on, on the individual level; first, between people (interpsychological) and then inside the child (intrapsychological). This applies equally to voluntary attention, to logical memory, and to the formation of concepts. All the higher functions originate as actual relationships between individuals (p. 57).

Expressing further on the method of the learning process, he states:

The level of actual development is the level of development that the learner has already reached, and is the level at which the learner is capable of solving problems independently. The level of potential development (the "zone of proximal development") is the level of development that the learner is capable of reaching under the guidance of teachers or in collaboration with peers. The learner is capable of solving problems and understanding material at this level that they are not capable of

solving or understanding at their level of actual development; the level of potential development is the level at which learning takes place. It comprises cognitive structures that are still in the process of maturing, but which can only mature under the guidance of or in collaboration with others (p. 85).

The implication is that what constitutes human knowledge and the contents of the mind and from which thinking and generation of other knowledge are built comes progressively from social and empirical learning. Teachings from external experiences programme the nature of mental activities and enables it to generate more knowledge through thought processing of already acquired knowledge. It is the extent to which a mind is filled with knowledge and trained to think well on them, that an individual can be said to be more wiser or learned than the other.

On the side of AI in epistemic development, Xie (2021) states that; "Intelligence is the result of the evolution of consciousness in nature. Although AIs cannot follow the exact evolutionary path of natural intelligence, they can take natural intelligence as an important reference." As such, in the humanoid intelligence, deep-learning becomes the mode. In deep-learning, Big-Data is the experience upon which AI thinks. Growing from algorithmic machine learning, AI utilizes sensors which are interface between external objects and brain-box memory activities. Carryer (2019) parallels human learning and machine learning thus:

Just like a machine learning algorithm, we construct models to explain the world around us. Some of these are very simple models. The baby playing peek-a-boo is learning one of the most fundamental of these models: object permanence, the idea that objects in the world continue to exist, even if we cannot immediately perceive them. This model is enormously useful in helping us make sense of the world around us. We close our eyes, and we are not startled when we reopen them to find the world roughly the same as we left it. We put something down, walk away, and when we need it again, we come back to the same spot to find it. This expectation is so essential to our experience of the world that it is easy to forget that it is a mental model—a construct of our minds. We continue to believe in objects' existence outside our perception not because we have any direct evidence for this, but because it is enormously useful for us to do so (para 8).

From this perspective Carryer argues that what scholars claim as theory of the mind is only a model to explain the actions of oneself or another being with reference to existence of hidden mental states- beliefs, emotions, intent, knowledge. For him, humans create these sophisticated learning models to form narratives with which we make meanings of complex behaviours: "A description of a series of events, tied together by some connective tissue of cause and effect, some sense of purpose and internal consistency—a deeper meaning" (para 12).

Advancing to deep learning AI makes complex analysis from particular primary experiences accumulated in Big-Data. In operational sense, big data 'consists of petabytes (more than 1 million gigabytes) and exabytes (more than 1 billion gigabytes), as opposed to the gigabytes common for personal devices' (Google Cloud, 2023). Here large and massive amount of data are made available for high smart systems to assess and make decisions on particular real-time conditions. In its analytical capacity big data involves 'the use of advanced analytic techniques against very large, diverse big data sets that include structured, semi-structured and unstructured data, from different sources, and in different sizes from terabytes to zettabytes' (IBM, 2023). Data itself are plain facts from empirical experiences which includes images, sound, numbers, names and the world, digitized and transmitted in binary form. Thus, big data assesses particular data in zettabytes quantity, both structured, semi-structured and unstructured, in order to make information out of them, make decisions and predictions out of them, as well as solve problems with them. Just as human mind learns and gathers information from the world of experiences, big data's empirical wealth of information is gathered from social media sites, telecom companies, e-commerce sites, weather stations and share markets (Java, 2023). These are platforms that galvanize different activities in the contemporary human and cosmological activities, and big data system is structurally and systematically equipped to integrate the large amount of data and to make knowledge out of them. They perform these through five major characteristics popularly known as 6 Vs (Adobe, 2023); interpret Volumes of Variety of Variable information with Velocity to produce Value with Veracity.

AI solutions use available big data to make decisions that are highly above human capacity in terms of speed, accuracy and even rationalization which can be better understood in computer language as visualization and simulation. Market Trends (2020) articulates the relationship between AI and big data as follows:

Big Data is a field that studies various means of extracting, analysing, or dealing with sets of data that are so complex to be handled by traditional data-processing systems. Such an amount of data requires a system designed to stretch its extraction and analysis capability. The ideal and most effective means of handling Big Data is with AI. Our world is already steeped in Big Data. There is a massive amount of data online and offline about any topic you can think of, ranging from people, their routine, their preferences, etc., to non-living things, their properties, their uses, etc.

Today, companies, institutions, industries are competitively dependent on AI and big data's decisions for operations and services, in which case, human rational capacities to make proper decision are supplemented with AI thinking processes, which provide larger, efficient, effective and objective knowledge about real-time situations and conditions. For Carryer (2019) thus:

Every algorithm, from the simplest classifier to the most sophisticated image generator, is the product of a human idea, the encoding of human beliefs. They are not just tools, but disembodied thoughts, shards of intelligence acting in the world. When we interact with an algorithm – when we are shown a movie recommendation, when we are pre-approved for a bank loan, when we are scanned through a security gate – we are interacting with a small reflection of a human being, a tiny fragment of a mind. The data they are trained on, the features in that data that they consider, their parameters for success and failure, all reflect the thoughts and desires, the hopes and the values of the people who created them. Far from being an alien intruder, or a foreign threat, machines are simply a new vessel for carrying forward our own thoughts and feelings. In a very real sense, they are our children. The machines will not replace us, they are us (para 13).

However, rationalists and likewise Descartes claim that it is only humans that think, and what AI does is all about processing data to generate information. It is on this believe that Descartes claims that to think is what makes the human person. Hence, the need to examine the context of thinking and what it entails to process data for both information and knowledge generation.

4.2. Thinking as Data Processing

4.2.1. Thinking and Thought

Acquiring knowledge is the major concern of philosophy from its literal translation of philo logos (love of wisdom), and thinking well is the instrument or rather an aspect in the process of knowledge acquisition. Hence, logic and critical thinking are courses in philosophy discipline (Pecorino, 1987). The concern of critical thinking is to indicate that not all mental processing are thinking since they may not identify the necessary relationships of mental contents towards reflecting particular reality. However, there is need to understand what this study affirms as foundations of thinking and thoughts. Gendlin (Gendlin, 1967) argues that the challenges of scholars in different disciplines in determining what thinking or thought is and similar human futures stem from the attempt to define human nature as a kind of content. Here, content entails raising questions about 'what sort of things is it "human" to be, do, feel, or think?' (p. 139). In the process of identifying human nature in respect to these perspectives tremendous varieties of definitions emanate, with no complete answer being forthcoming. For instance, while philosophers battle with empiricism and rationalist perspectives of mental states and thinking processes, psychologists come up with behavioural and environmental cognition processes, and the neurologists hinge on brain states. For Gendlin, therefore, an individual's thought and actions involves an order of relationship between body, person and culture. There is no common human nature "underneath" what culture produces as an individual as the values a human person aims at, designs as final cause or as a norm are within the frames of particular cultural models. Gendlin argues:

The human, apart from culture, is not possible. Apart from cultural forms, humans do not eat, grunt or procreate. Man's animal functions are culturally patterned. The individual self develops out of an interpersonal, linguistic and cultural matrix. The individual is cultural, social and interpersonal before he is an individual. An individual emerges from biology, culture and his own situations as an original mixture who makes a life out of them. The human individual exists only as he transcends the givens of both biology and culture: first biology and culture, and then the human individual (p. 141).

Two points are strong in the above stance about human nature, that:

- i. Man's animal functions are culturally patterned, and
- ii. The process of individuals' development is a matrix of interpersonal, linguistic and cultural interactions.

Thus, the biological (man's animal function) and the cultural patternings form the raw material with which an individual lives. Giving that the patterning are not a complete whole as there are complexities of both biological and cultural patterns, the individual uses these raw material to fashion out a living process. This requires enormous creativity to bring patterned demands together, as all play on any one situation (p. 141). Gendlin analyzes the process as follows:

The individual in any society faces the task of living, which is never organized fully for him. In fact, the more highly organized a culture becomes, the more it is never organized fully. The reason one has to pick his steps through each day, the reason he has to figure out what to do from one life situation to the next, is because of the growing contradictions and stoppages imposed by the highly organized society. Our bodies are so complex, our language and our cultural backgrounds are so rich, the situations that make up life from one hour to the next are so complicated, everything is already so highly organized that very exacting conditions are required of any synthesis that will work (p. 143).

Within this framework, to live requires an experiential process, a necessarily creative process, a feat, in the bid to succeed. The individual examines through experiencing and creative processes, man's animal functions within patterned culture to identify what can make his living to succeed. The 'experiencing process is "the given" of body and culture – but in motion' (p. 143). The motion involves thought and thinking of the individual person on the raw materials seeking novel ways to bring together the many different roles and values within experience. It involves thoughts that are in constant interplay, and in such mode thinking occurs in somewhat zig-zag form. Gendlin highlights this view as follows:

We can move from a concept to its logical implications, and we can also move from a concept to what we were getting at in using that concept, what we meant, felt, what we were trying to do in using it. We can pay attention to that. But that is experiential, implicit, not verbal. We must pay attention to the feeling process we had in using the concept. Thus we can arrive at another verbalization, another concept, another role, another definition. Zig-zagging, we can arrive at a different place than we could possibly have gotten to by logical steps alone. We need both logic and the zig-zag to feeling and back again. If we were to lose logic, we would lose precision and we would not know what we were saying. On the other hand, in living, problem solving, psychotherapy, and listening to someone, in life generally, we need more than the alienated patterns of logical and social roles, more than what is socially appropriate or what follows logically. We need also to pay attention to our experiencing at the moment. What are we getting at? What are we up against? If we are listening to someone, "What is he getting at? What is he up against?" (p. 144).

The logical and zigzag iteration of thoughts are what scholars on mind do categorize as critical thinking, conceptualization, association, decision-making and related forms. However, Gendlin view on thinking is that it entails experience and creation of meaning. Creating meaning requires systematization of thinking process or thinking skills through education. In his work on Focusing Gendlin ([Gendlin, 1982](#)) describes it as level of scientific thinking:

There is a new method here, not only for personal concerns but also for theory and science. Logical thinking stays within whatever 'conceptual boxes' it starts with. It has only the different, competing interpretations, assumptions, viewpoints – and one must stay within one of these. When felt sense is the touchstone, one can try out all kinds of different concepts without being locked into any one set. This is what scientists (now rarely) do when they come up with something new after living with a problem for a long time. Rather than using concepts only, one can return to one's un-split felt sense of whatever one is working on (p. 57).

Trying out different interpretation of concepts requires skill gained through education. The essence of education is not necessarily to make thinking more objective, but to intermediate the conflicts between different subjective experiences in a communal world. For Thorgeirsdottir ([Thorgeirsdottir, 2022](#)).

We are socially constructed by norms, values, ideas, social structures, conditions, and goals and at the same time we are subjective, experiential beings with a unique perspective on the world because we are all differentially located, situated, and conditioned. This felt situatedness is what gives us our individuality and allows us to come closer to ourselves, not as a narcissistic move, but as a move that increases plurality and deepens universality in the world. The more self we are in thinking, the better we are understood by others. And the closer we come to our own thinking, the better we can understand others' thinking (p. 215).

Education is about constructively dealing with plurality of experiences and systematizing approaches to problems. In Thorgeirsdottir's view, it entails 'presenting a different way of connecting and orientating oneself in thinking in-with-about the world' (p. 211). It is about building the internal cognition process on experiences from childhood to adulthood in a form of continuum, where the body becomes the bridge from old humanity to new humanity. As Thorgeirsdottir analyzes the continuum; "we become thinking beings by precisely being able to learn to articulate, verbalize, differentiate, distinguish, and reflect the sense certainty that characterizes infant perception according to Hegel's phenomenology of the itinerary of human consciousness from infancy to maturity as a journey towards the concept and abstract philosophical reflection. On this journey it is necessary in Hegel's view to break 'the child's self-will and thereby eradicate his purely natural and sensuous self'" (p. 206-7). Through education as building of the mind on how to think, a child grows in different levels of learning in order to produce outputs in words and action, that is of positively expected result in human society.

The idea of biological and cultural patterning of thinking and thoughts as analyzed by Gendlin and human programming as building of thinking skill in education, can be integrated in Feldman Barret (Thorgeirsdottir, 2022) assertions that; "The human brain is a cultural artifact. We don't load culture into a virgin brain like software loading into a computer; rather, culture helps to wire the brain. Brains then become carriers of culture, helping to create and perpetuate it" (p. 184).

In any case, in the early writings of Descartes, some articles in his Rules for the Direction of the Mind¹, state his view on what human reasoning entails which reflect more of processing of one mental content from another:

Rule 17: We should make a direct survey of the problem to be solved, disregarding the fact that some of its terms are known and others unknown, and intuiting through a train of sound reasoning, the dependence of one term to another (p. 70).

Here, Descartes opines that the mind is trained on how to reason well which entails ability to recognize and identify the dependence of one term to or from another. In this case, even when the words used to represent ideas are things which are abstract, the mind is trained to recognize their relationships.

Rule 18: For this purpose only four operations are required: addition, subtraction, multiplication and division. The later two operations should seldom be employed here, for they may lead to needless complication, and they can be carried out more easily later (p. 74).

Here, the concern is how ideas can be generated majorly through addition and subtraction of particular knowledge given their examined relationships, and sound reasoning is when the mind chooses properly where to add or subtract.

Rule 19: Using this method of reasoning, we must try to find as many magnitudes, expressed in two different ways, as there are unknown terms, which we treat as known in order to work out the problem in the direct way. That will give us as many comparisons between two equal terms (p. 76).

Here, when the mind has mental ability to recognize patterns and relationships of particular knowledge, they can thenceforth generate new knowledge through mathematical processing of what is known. However, the term processing is commonly alluded to machine mathematical computing.

But Rouse (Feldman-Barret, 2011) defines information processing as manipulation of digitized information by computers and digital equipments to produce specific results. In AI world, data processing is widely used which 'includes the conversion of raw data to machine-readable form, flow of data through the CPU and memory to output devices, and formatting or transformation of output' (Rouse, 2011). Khandelwal (2023) gave a broader explication as follows:

Data processing is a series of operations performed on data to transform, analyze, and organize it into a useful format for further use. The goal of data processing is to extract relevant information from raw data to support business operations like decision-making and forecasting. It can involve steps like data collection, data entry, cleaning, transformation, integration, analysis and visualization (p. 2).

In these definitions, processing is identified with capacities of transforming information to produce particular knowledge/result, by logical extraction of relatedness of various information. Processing is done through input of information, examination, analysis and integration of information based on particular problems, decision-making, behaviours (like in robotic engineering) and results. The processing skills are dependent on programmed conditions of logic encoded in computer language. Through trained machine learning and deep learning, AI has capacities of performing batch processing, distributed processing, real time processing, and parallel processing (Gregersen, 2023), and processing of these wide range of data limit marginal conditions to error in problem solving. In manipulation and transformation of data, AI reflects on relationships between stored/known data in other to relate thier logical conditions to produce results. Thinking as the human form of data processing activities is affirmed in cognitive psychology. According to McLeod (2023).

At the very heart of cognitive psychology is the idea of information processing. Cognitive psychology sees the individual as a processor of information, in much the same way that a computer takes in information and follows a program to produce an output... For example, the eye receives visual information and codes information into electric neural activity, which is fed back to the brain where it is "stored" and "coded." This information can be used by other parts of the brain relating to mental activities such as memory, perception, and attention. The output (i.e., behavior) might be, for example, to read what you can see on a printed page. Hence the information processing approach characterizes thinking as the environment providing input of data, which is then transformed by our senses. The information can be stored, retrieved, and transformed using "mental programs," with the results being behavioral responses (p. 2).

Human activities are propelled by these mental activities through decision making, creativity, imagination and problem solving. Mental activities are the human psyche undergoing the process of thinking. Sam (2013) defines thinking as; "the cognitive process of manipulating information to create meaning, solve problems, make decisions, and generate new ideas. It involves various mental activities, such as attention, perception, memory, and language. As an internal mental process, thinking is not directly observable but is inferred from behaviors and verbal reports." From this definition thinking entails the capacity of human mind to manipulate available information and knowledge to reach a decision or make judgement. Decisions and judgement contain processed mental contents/data which can be known and assessed through behaviours and utterances. By implication, human thinking capacity and capabilities are known through thier output in behaviours, verbal and written expressions. Thus, some actions and expression indicate that thinking is either not done well, or not well enough. For Kelly (2011), 'thinking refers to the process of creating a logical series of connective facets between items of information.' This implies that thinking well requires skills which aid the mind in identifying properly the connective facets of ideas and information as taught, experienced or imagined. The skills aid the mind in integrating new experiences and ideas logically for better decisions, behaviours and expressions. Kelly identified thinking skills to include focusing, remembering, gathering, organizing, analysing, integrating, connecting, compiling, evaluating and generating. In these skills the thinking activity is galvanised by logic of 'what if', both as analytic and critical thinking.

Descartes himself affirmed thinking as judgements and conclusions from reflected experiences. Thus, extrapolating processing from his concept of thinking entails; when experiences does not correlate, doubt emanates; when environments are reflected as subjectively or objectively conducive, willingness or unwillingness occur as the case may be; when logical sequence between old and knew knowledge are established, understanding becomes a result. Hence, Descartes thinking characteristics are end product of acceptance or rejection of beliefs made from mental processing of relationships of the beliefs. Inexorably, Descartes affirms that the capacity to recorgnized conditions for doubt, denial, unwilling, willing and feeling, by a mind, makes the mind human. Based on this perspective, the ability of AI to recorgnize (understand) conditions of doubt, denial, unwilling (reflected as error), and affirm to follow right or wrong logical request from myriads of structured and unstructured data, all reflected in its memory, meet Descartes condition for its

humanness. In matters of feelings, development of high powered sensors avails humanoid-AIs the power of detecting hotness, coldness, lack, threats and even lies.

Recalling Locke's empiricism oncemore, thinking is the activities of the mind in affirming or rejecting the relationship between ideas and learned experience. Dividing mental apprehensions into simple sensational knowledge and complex reflective knowledge, Locke relates the mental ability to integrate simple sensory ideas to complex intellectual ideas:

The acts of the mind, wherein it exerts its power over simple ideas, are chiefly these three: 1. Combining several simple ideas into one compound one, and thus all complex ideas are made. 2. The second is bringing two ideas, whether simple or complex, together, and setting them by one another so as to take a view of them at once, without uniting them into one, by which it gets all its ideas of relations. 3. The third is separating them from all other ideas that accompany them in their real existence: this is called abstraction, and thus all its general ideas are made (p. 132).

In the above, mental process of reflecting on ideas are quite same in what humanoid-AI processing entails, and the ability and capacity to make empirically and logically connected relations on ideas brings about correctness of knowledge. For Park (2008), Locke's theory of knowing and the limited nature of human knowledge given limitedness of experience are incorporated in his principles for decisive knowledge:

1. Principle of evidence: Collect an adequate and representative body of evidence, both pro and con of the proposition to be assessed.
2. Principle of probability: Calculate the probability of the proposition in question on the basis of the body of satisfactory evidence.
3. Principle of proportionality: Proportioning the firmness with which you believe or disbelieve on the probability of evidence (p. 217).

Engaging in the three, the mind processes the relationship between ideas as they relate to experience. From agreement or disagreement between perceived ideas, the mind makes judgement, and express them as end product of reason. Locke's principles of evidence, probability and proportionality are internal processing mechanism of AI better expressed as computer systematic logic in correlating information and making conclusion expressed through output. Market Trends (2020) refers to AI intelligible activities as not necessarily artificial but a particular kind of intelligence different from the kinds of human and animal intelligence. For him, it better examined as machine intelligence where thinking activity is utilized better, faster and more correct through machine codes. In any case, Xie (2021) defines intelligence as 'the function of adapting behaviour to a specific purpose and the ability to produce a specific result based on the identification, judgement and evaluation of objective causes' (p. 40). As human and animal intelligence increase through teaching and applying of experiences, machines undergo teachings through codes and made to take make decisions based on the agreement or disagreement of identified data.

When taught, a machine can effectively perceive its environment and take certain actions to better its chances of achieving set goals successfully. How can a machine be taught? The root of Machine learning involves writing codes or commands using a programming language that the machine understands. These codes help lay out the foundation of the machines' thinking faculty, such that the machine is programmed to perform certain functions defined in the codes. These machines are also programmed to use their basic codes to generate a continuous sequence of related codes in order to increase their thinking, learning, and problem-solving capabilities when the workload is increased (p. 3) (Xie, 2021).

4.2.2. Humanoid-AI Thinking Process

ChatGPT is an AI system trained in using dialogue format to have prompt and detailed conversations with people on various issues for educative and learning purposes. This is reminiscent of Socrates training of minds of his student on method of dialogue as intelligible way acquire knowledge. In its own case, 'dialogue format makes it possible for ChatGPT to answer followup questions, admit its mistakes, challenge incorrect premises, and reject inappropriate requests' (para 3) (Open, 2022). The training was done using InstructGPT and Reinforcement Learning from Human Feedback (RLHF). By implication the mental system in human

feedback are created and developed to systematize information from big data as they relate to interlocutors interactions. Relating to its generative capacity Hetler (2022) explains:

ChatGPT works through its Generative Pre-trained Transformer, which uses specialized algorithms to find patterns within data sequences. ChatGPT uses the GPT-3 language model, a neural network machine learning model and the third generation of Generative Pre-trained Transformer. The transformer pulls from a significant amount of data to formulate a response (para 5).

5. Conclusion

Although developments in humanoid-AI is still evolving, its interactive capacity both in language and information processing have already overtaken Descartes' claims on language and multi-tasking as conditions of a thinking-thing. With language, ChatGPT assists people in answering their questions as well as assist in carrying out tasks. It is capable to do these through reflections on volumes of ideas contained in big data as it's mind and memory, done in faster mode than human reflections and memorization. These capacities make such being human, in Descartes' thinking-thing narrative. It will be proper for this study to finally conclude with Dreyfus (2007) reconciliation of inputs of philosophers and scientists on AI developments:

As I studied the RAND papers and memos, I found to my surprise that, far from replacing philosophy, the pioneers in CS[Computr Science] had learned a lot, directly and indirectly from the philosophers. They had taken over Hobbes' claim that reasoning was calculating, Descartes' mental representations, Leibniz's idea of a "universal characteristic" – a set of primitives in which all knowledge could be expressed – Kant's claim that concepts were rules, Frege's formalization of such rules, and Russell's postulation of logical atoms as the building blocks of reality. In short, without realizing it, AI researchers were hard at work turning rationalist philosophy into a research program (para 5).

References

- Adobe (2023). *What is Big Data*. Available at: <https://business.adobe.com/blog/basics/big-data> [Accessed 22 August 2023].
- Avramides, A. (1996). *Descartes and Other Minds*, *Teorema*, 16(1), 27-46.
- Bunge, M. (1956). *Do Computers Think*. *The British Journal for the Philosophy of Science*, 7(26), 139-148.
- Carryer, S. (2019). *How Computers Think*. *Towards Data Science*, 20 October. Available at: <https://towardsdatascience.com/how-computers-think-c2e01c2fe33c> [Accessed 20 September 2023].
- Curado, M. (2019). *Automata's Inner Movie: Science and Philosophy of Mind*. *E-book*. Available at: https://www.academia.edu/85228665/Automata_s_Inner_Movie_Science_and_Philosophy_of_Mind_PDF_E-Book_ [Accessed 20 January 2023].
- Dennett, D. (1998). *Brainchildren, Essays on Designing Minds*. MIT Press and Penguin.
- Descartes, R. (1991). *The Philosophical Writings of Descartes*. 3 Vols. (Trans.) John Cottingham, Robert Stoothoff, Dugald Murdoch and Anthony Kenny, Cambridge University Press.
- Dreyfus, H.L. (2007). *Why Heideggerian AI Failed and How Fixing it Would Require Making it More Heideggerian*. *Artif. Intell.*, 171(18), 1137-1160.
- Feldman-Barret, L. (2017). *Cum iau na, stere emotiile?*. Cluj-Napoca, Editura Ascr.
- Gendlin, E.T. (1967). *Neurosis and Human Nature in the Experiential Method of Thought and Therapy*. *Humanitas*, 3(2), 139-152. http://previous.focusing.org/gendlin/docs/gol_2040.html
- Gendlin, E.T. (1982). *Focusing*. Bantam Books.
- Google Cloud. (2023). *What is Big Data*. *Google Cloud*. Available at: <https://cloud.google.com/learn/what-is-big-data> [Accessed 24 August 2023].
- Gregersen, E. (2023). *Data Processing*. *Encyclopedia Britannica*, 16 August. Available at: <https://www.britannica.com/technology/data-processing> [Accessed 24 August 2023].

- Hetler, A. (2022). Definition: ChatGPT. *Tech Target*, No Date. Available at: <https://www.techtarget.com/whatis/definition/ChatGPT> [Accessed 20 August 2022].
- IBM. (2023). Big Data Analytics. *IBM*. Available at: <https://www.ibm.com/analytics/big-data-analytics> [Accessed 24 August 2023].
- Java. (2023). What is Big Data?. *Java TPoint*, No Date. Available at: <https://www.javatpoint.com/what-is-big-data> [Accessed 20 August 2023].
- Kelly, J. (2011). Thinking. *The Peak Performance Centre*. Available at: <https://thepeakperformancecenter.com/educational-learning/thinking/> [Accessed 24 August 2023].
- Khandelwal, A. (2023). What is Data Processing? Definitions, Stages and Methods. *Indeed*, 4 May. Available at: <https://www.indeed.com/career-advice/career-development/what-is-data-processing> [Accessed 24 August 2023].
- Locke, J. (1689). *An Essay Concerning Humane Understanding*. Vol. 1, Project Gutenberg.
- Luis, G.H. (2024). The Mind as Machine. *Cogsweb Project*, No Date. Available at: <https://www.cs.bham.ac.uk/research/projects/poplog/computers-and-thought/chap1/node5.html> [Accessed 5 January 2024].
- Market Trends. (2020). Using Artificial Intelligence in Big Data. *InQubeta*, 3 June. Available at: <https://www.analyticsinsight.net/using-artificial-intelligence-in-big-data/> [Accessed 12 August 2023].
- Markie, P. and Folescu, M. (2023). Rationalism vs. Empiricism. in Edward N. Zalta and Uri Nodelman (Eds.), *The Stanford Encyclopedia of Philosophy*, Spring Edition. Available at: <https://plato.stanford.edu/archives/spr2023/entries/rationalism-empiricism/> [Accessed 24 August 2023].
- McLeod, S. (2023). Information Processing Theory in Psychology. *Simply Psychology*, 16 June. Available at: <https://www.simplypsychology.org/information-processing.html> [Accessed 23 August 2023].
- Microsoft AI. (2023). Putting Azure AI to Work. *Microsoft*. Available at: <https://www.microsoft.com/en-us/ai> [Accessed 24 August 2023].
- Open AI. (2022). Introducing ChatGPT. *OpenAI*, 30 November. Available at: <https://openai.com/blog/chatgpt> [Accessed 25 August 2023].
- Panovski, A. (2023). How did Philosophy Help Develop Artificial Intelligence?. *The Collector*, 14 December. Available at: <https://www.thecollector.com/philosophy-artificial-intelligence-development/> [Accessed 8 January 2024].
- Papert, S. (1980). Computer-Based Microworlds as Incubators for Powerful Ideas. in R. Taylor (Ed.), *The Computer in the School: Tutor, Tool, Tutee*, 203-210, Teacher's College Press.
- Park, L. (2008). Hegel and Locke on the Thing of Perception. *Proceedings of the Xxii World Congress of Philosophy*, 16, 213-219.
- Pecorino, P. (1987). Critical Thinking and Philosophy. *Informal Logic*, IX(2&3), Spring and Fall, 142-145.
- Rouse, M. (2011). Information Processing. *Techopedia*, 18 August. Available at: <https://www.techopedia.com/definition/25605/information-processing> [Accessed 23 August 2023].
- Sam, M.S. (2013). THINKING. *Psychology Dictionary*, April 29. Available at: <https://psychologydictionary.org/thinking/> [accessed August 24, 2023].
- Thorgeirsdottir, S. (2022). Luce Irigaray's Philosophy of the Child and Philosophical Thinking for a New Era. *Sophia*, 61, 203-218. <https://doi.org/10.1007/s11841-022-00920-5>
- Turing, A. (1950). Computing Machinery and Intelligence. *Mind*, 59(236), 433-60.
- Visintainer, J.R. (2002). Descartes' Theory against Artificial Intelligence and the Micro-World. *Marquette University*.
- Vlasin, I., Maties, V., Ioana, D. and Oprea, D. (2019). The Transcultural Perspective and the Smart Education. *Transdisciplinary Journal of Engineering & Science*, 10, 93-104.

Vygotsky, L. (1978). *Mind in Society*. Harvard University Press.

Wheeler, M. (2013). *God's Machines: Descartes on the Mechanization of Mind*. in P. Husbands, O. Holland, and M. Wheeler (Eds.), *The Mechanical Mind in History*, MIT Press Scholarship Online, 22 Aug. 2013. <https://doi.org/10.7551/mitpress/9780262083775.003.0013>

Xie, J. (2021). *An Explanation of the Relationship Between Artificial Intelligence and Human Beings from the Perspective of Consciousness*. *Cultures of Science*, 4(3).

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