The Rational-Empiric Model of the Functional Intellect and the Structural Brain

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Abstract: The traditional conflict in epistemology has been between rationalism and empiricism. Philosophers have often tried to align themselves in one of these schools even though a close reading of some of their writings may suggest they may often have used both varyingly, one more than the other. This paper demonstrates that both rationalism and empiricism work together and are thus called the rational-empiric model. The paper extends the scope of the rational-empiric model to also evolving cognitive developments and other aspects of reasoning such as computational thought and makes an effort towards summarizing the nature of human reason by explaining the functional intellect and the structural brain since the time of Aristotle to date drawing from theology, philosophy, logic, computer science, and psychology. The paper presents the rational-empiric model in a broader in-depth context with supporting ideas and evidence. Various literature on theology, logic, philosophy, and psychology has been used to elaborate on the concepts. The paper concludes that the purpose of the rational empiric model is to discover knowledge by finding and understanding ontologies as they exist and function or as they ought to exist and function.

Keywords: Rationalism, Empiricism, Critical Thinking, Cognitive Psychology, Memory, Computational Thought, Divine Law, Theology, Epistemology

1. Introduction

Knowledge acquisition cannot be only confined to the process of rationalism or empiricism. To attain knowledge, one must use the rational-empiric model of the functional intellect and the structural brain. Without this human species is no different from a beast. The importance of the rational-empiric model is not only epistemic but also spiritual.

The discussion starts with a theological and philosophical outlook and then moves on to explain the details of the rational-empiric model drawing concepts from theology, philosophy, logic, and psychology. It is found that the rational-empiric model has expanded as human cognition developed and as psychological understanding discovered deeper levels of cognitive processes. To what extent the human rational-empiric model may develop one cannot predict but the current paper has discussed as much as it has developed until now since the time of Aristotle while discussing the core concepts and elaborating it often providing new perspectives.

Most logic and philosophy books discuss the reasoning and thinking necessary and relevant to the study of traditional and formal logic without bringing in ideas from computer science, psychology and theology. This paper bridges the gap between reason and the human mind and how everything fits together, and this is why the title also is reflective of this bridge.

In the end, the reader will get an overview of human reasoning and understand what it means to be reasonable, and how our intellect and biology works as a joint collaborative model.

2. Method

The discussion draws concepts from epistemological theories and relates to psychology, computer science, theology, and logic. It exposes a realist objective outlook of knowledge through the postulation of real ontologies independent of human subjectivity. It uses both a top-down and bottom-up approach vis-à-vis theory and data from the literature.

3. Result

The purpose of the rational empiric model is to discover knowledge by finding and understanding ontologies as they exist and function or ought to exist and function.

4. Discussion

4.1. Theological and Philosophical Foundation

Theologically and historically speaking there have been two teachers of mankind; prophets of God and the rational-empiric model. Prophets of God have often imparted higher knowledge, meaning, the rational-empiric model may have failed to grasp it in the first instance or even soon enough due to lack of its maturity or effective utilization, but neither the model contradicted the revealed knowledge[1]. Quran's support for the rational-empiric model is embedded in its various texts[2] so that using this model truth is reached[3]. Truth can be defined as something which has permanency, unchangingness, universality, and generality as long as its relevant ontology exists. So, to thrive and progress without divine revelation and the rational-empiric model humans would have to depend on our uncertain intuition, often mostly oppressive unjust whimsical authority as history shows and sheer luck.

What is so special about a prophet? The divine authority is different from earthly authority because the divine authority is always established by divine revelation whose primary support is characterial and miraculous, and the secondary support is the rational-empirical. For Islam, it is the character of the prophets, messengers, and their respective miracles that give primary support to divine authority whereas the rational-empirical model gives support to science in Quran for example[4].

Care must be given not to separate God and science as this may result in either one becoming superstitious or an atheist, so the rational-empiric model is no way to reject God or refute His ever-present dominion on nature of creation neither religious text is no way to reject God's creational truths. Humans, above all other living things, have been granted this unique rational-empiric model so that they glorify God, to live life rationally, morally, and intellectually productive. This is the higher purpose of the rational-empiric model.

Why has the discussion started with God, prophet, and divine revelation if the impulse is to reject anything Godly from reason and critical thinking? Two reasons for this: purpose and evolution [25]. If natural selection is a driving force over evolution, then by observation it is seen there is a purpose to it because of how human and animal activities are created, sustained, and completed. It is fair to say that the leap from biological physicalism to a natural selective force is no different than the leap from the design of the universe to God's existence and divine purpose. Secondly, evolution creates complexity from the simplicity which would mean God as a simplistic creation of primitive man should have gone extinct by now [26] from our complex evolved brain, but it seems God continues to live based on the rational-empiric model. This is why the discussion of God, prophet, and divine revelation had to be done and the purpose and role of the rational-empiric model with regards to these had to be established.

The rational-empiric model is the only way for the human mind to reach ontological truths in God's creation which means it is the tool for reaching knowledge; justified true belief. God creating the creation on truth means truth-values of relevant ontologies are unchanging because the core traits of a truth value are its permanency and consistency. These traits are the foundation of science as well. This is different from the personal spiritual realization that comes about by God's direct blessings through revelation or divine inspiration such as knowledge about God, God's plan, state of things in the afterlife, etc., which has no way to be ascertained scientifically objectively but depends on the quality of the individual's spirituality, piety, and the extent of one's rational-empiric utilization.

Is knowledge possible if the rational-empiric model is true? Can knowledge be certain or even probabilistic? There can be three proofs that knowledge can be both probabilistic and certain. First is, God would not have created the creation on truth values with its relevant ontologies if knowledge was just something unachievable and uncertain. Secondly, have not science been working more than it has not, to better our lives and help us understand existence? Third, from the science of psychology, our sensory faculties are quite accurate as the human perceptual system is wired for accuracy, and people are exceedingly good at making use of the wide variety of information available to them [1]. If one or more of the sense experiences become defective our perception changes. If certain parts of the brain are damaged our cognition and judgment change. If the soul leaves the body, the body dies. It is then fair to say that humans are designed for accuracy and acquiring knowledge.

Even though disagreement is a part of the rational-empiric model, dialectical and logical disagreement is a positive aspect to arrive at knowledge [2]. It stimulates the functional capacity of our intellect through our experience of consciousness being

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[1] *"O Shu'aib! We do not comprehend much of what you say.." (Quran 11: 91).* One of the things Shu'aib was talking about was a system of economic welfare flowing from the rich to the poor to maintain a zquantified wealth flow to minimize the economic class gap. Obviously, the exploitative class of people failed to understand this due to a lack of maturity of their rational-empiric model or lack of utilizing it due to bias. Quran 11: 87 states, *"They said, O Shu'ayb, does your prayer [i.e., religion] command you that we should ...not do with our wealth what we please?"*

[2] Quran has repeatedly encouraged that in the creation there are signs/indications/hints for people who believe (Quran 6: 99 and verses), who think (Quran 13: 3 and verses), who reason (Quran 2: 164 and verses), who has mind (Quran 3: 190 and verses), who perceive (Quran 3: 13), who hear (Quran 16: 65 and verses), etc., all these indicating the existence of something to understanding God's creations in its varied existences.

[3] God created the heavens and earth on truth as stated in Quran (15: 85)

[4] The rational-empirical model can be used to justify and defend divine revelation both in the natural sciences as in scienceinquran.com and in the probabilistic-statistical sciences as in the example of a correlation between drunk driving and accidental deaths.

functional as it is used to guide and control our behavior, and to think logically about problems [3]. Those who are skeptical about acquiring knowledge may be suffering from source monitoring errors as fantasy-prone people are more likely to experience source monitoring errors [4].

Dialectical and logical disagreements lead to knowledge in the following ways: a) established truths b) scientists and scholars are in disagreements and yet to reach truth c) various theories exist but some of the theories were proven wrong but other true theories need to be seen on different ontological contexts all completing towards a greater whole.

4.1.1. Prerequisite of the Rational-Empiric Model

To fully and sincerely utilize the rational empiric model of the intellect – a functional ontology -, and the brain – a structural ontology-, detachment from impulse and emotion is a necessity. Our psychology is driven by genetics, environment, emotion, and reason and it is the last thing – reason - rational empiric psychology and functionalism need to be trained and maintained. The rational empiric model is all about at the end finding truth values in various ontologies so self-detachment from social impulses through understanding it in its correct ontology is a requirement because society is often based on irrationality, cognitive, emotional, and behavioral contradictions, inconsistent thought, and behavior and base desires. Emotion causes us to lose the cognitive focus making us careless and causing irrelevant steps in analysis and polluting the integrity of the rational empiric model [5]. This is the point where the utilization of unnecessary possibilities creates confusion and skepticism. To avoid this, trained people often have a strong understanding of their respective specialties and domains to apply the rational-empiric model.

4.1.2. Is the Rational-Empiric Model Acquired or Inherent

There are three views in psychology about human cognition: a) human mind is like a clear empty slate and learning is acquired through association [6, 7] b) human mind is already equipped with certain intellectual tools [8, 9, 10] c) human needs to acquire certain intellectual tools hierarchically to be cognitively mature and developed [11]. Why cannot all these truly exist in different ontologies? Some aspects of the child's brain are on a clean slate [12], but the intellect is not empty of basic functional instructions as it should contain some basic logical principles and reasoning abilities which are revealed with time and developed hierarchically. This is a reasonable way of reconciling the different views.

4.1.3. What Is the Rational-Empiric Model

There are two ontologies. What is outside of us and what is inside of us? The outside consists of all the objective ontologies that the sensory experience can detect and perceive in the brain. What is inside of us is the brain and its functioning of cognition and the very soul of the human body. This holistic perspective can be established by simple omission and addition of the senses and brain functioning. The empirical outside is the source of information for the brain which can process through the rational part. For example, psychological science proposes geometric mathematical principles of human perception that describe how humans group similar elements, recognize patterns and simplify complex images through the physical empirical construction of proximity, closure, similarity, and simplicity [13] and that cognition is a collection of processes by which sensory empirical information is transformed, reduced, elaborated, stored, recovered and used [14]. The Rational-empiric model thus can be defined as this whole process of the brain, intellect, and outside interaction.

For the sake of this paper, it is assumed that the rational model is the structure and dynamics of our human cognition mainly consisting of inviolable logical rules, deductive and inductive inferences, a priori judgment, ability to understand language, computational thinking, and mathematical inference whereas the empiric model is all about the scientific method which consists of controlled usage and application of our senses through variables in observation and experiment [24]. Some of the major cognitive rules are rules related to the argument itself, rules related to inference, form, and pattern, rules related to the semantics of argument, and rules related to conceptual distinctions [15]. All these combined constitute the current rational-empiric model. The psychological cognitive underlying process of this whole model is Wundtian in nature, that is, core cognitive foundations underly the rational-empiric model which are an association, storage, composition, and decomposition of information in varying cognitive processes and timing [16].

The rational-empiric model provides us with two pathways to knowledge: proven and provability. If something is proven as true or disproven as false, then it is the rational process whereas if something can be provable as true or disprovable as false then it is the logical process. This is an important distinction because new knowledge can only be achieved based on established knowledge, or else humans would be venturing, for example, into infinite possibilities of subjunctive and counterfactual conditionals. The rational empiric model follows synchronous or asynchronous processing of information from memory so proper sequencing to strongly constructed data is a key requirement in understanding the existence of truth values.

The ultimate use of the rational empiric model is when it can explain and justify ontologies as clearly and completely as possible. The most important constituents of any complete ontology are variables, material conditionals, processes - an activity or set of activities involving one or more interdependent or independent variables based on some mathematical, natural, or social rule - such as correlation, causation, synchronicity, asynchronicity, set of members which constitute its classes and their related identities and functions, and lastly its holistic or specific dynamism and algorithm.

Gestalt psychology can be used to illustrate a simple ontology. In Gestalt psychology "organized experience" is the ontology. Experience is the first level variable and shape, form, configuration, and totality are lower-level variables.

The geometric mathematical principles/laws of human perception that describe how humans group similar elements, recognize patterns and simplify complex images through the physical empirical construction of proximity, closure, similarity, and simplicity are processes. All the geometric objects of the world can be considered its set of members while the actual innate organizational abilities that influence how the world is perceived constitute the dynamism and algorithm of Gestalt psychology [17, 13].

4.1.4. The Fundamental Process of Rational-Empiric Model

Inference from truth values is the fundamental goal of the rational-empiric model. Inferences are made from generated propositions and the whole existence is a source for abstracting and constructing propositions. Inferences are sometimes made based on psychological associations among concepts, necessary connections among concepts, and acquired constructed associations among concepts. While inferencing from true propositions all other conditions, constraints, and possibilities related to the relevant premises must be addressed for achieving a strong and sound argument. Simply put, inferencing is establishing proper connection among terms and concepts and constructing proper sequencing in the argument through the correct inferential form and propositional connectives [18].

4.2. The Essential Constituents of the Rational-Empiric Model

The proposition is the fundamental building block of the model. The atomic proposition is the smallest required element for a propositional truth value. The understanding of proposition depends on three things: linguistic rules, rules of logic, rules of mathematics, and the scientific method. Every proposition can contain a higher level, a lower level, and an apparent level.

4.2.1. Truth-value

There are three types of truth value: semantic, normative, and factual. The semantic truth value of proposition and statement depends on the rules of language, technical logic, and mathematics. Normative truth value doesn't mean a norm is objectively true but what it means is that a norm exists in some people or cultures or settings. Factual truth value is something that exists, occurs, or is a process, objectively independent of any observer, or what society or people think or say. This can be also certain moral norms that are right and good or wrong and bad irrespective of people's acceptance or denial. Such norms are to be practiced across all cultures in the same situations of its performance. Such norms are always divinely revealed because this depends on the ultimate success of the human soul.

4.2.2. Language

For the rational-empiric model to function one must utilize the language construct which, according to Chomsky's transformational grammar [19], is more or less universal across all languages and the most basic of its constituents are meaning and form. Meaning is a process by, process for, and process on. Every proposition of a language must have an atomic process to generate meaning. Process changes state. As an example, the proposition of Descartes "I think therefore I exist" has two processes consisting of the words "think" and "exist", the process by the subject "I" but the process on and process for are both on the self "I". The "state changes" happened when existence was derived from thought. One major function of language in expressing the rational-empiric proposition is its ability to provide organization, coherency, clarity, precision, relevancy, and significance. Language becomes confusing when ambiguities and vagueness arise. This happens when the syntactic element fails to establish the required relevant reference. Reference is different from feeling or sense created by language. Reference can be an ontology, a process, or a value of a variable, for example, the proposition "Aristotle was a philosopher". There are two syntactic terms here: Aristotle and philosopher both refer to a man of ancient Greece.

4.2.3. Logic

Propositional predicate logic is the heart of the rational-empiric inference model. Such logic is about clarity and precision in semantic and inference. It helps us understand syntactic and semantic entailment precisely and clearly. This means any propositional entity, or its related atomic or complex process must be identifiable in syntax and semantics. To achieve this all of the linguistic construction must be reduced to atomic processes which then can accept logical rules for propositional predicate logical construction of truth values.

The proposition is built on class containment, a predicative process using verbs for example, and quantifiers. For example, the proposition "Aristotle was a great philosopher" has the class philosopher being attributed to a man named Aristotle. This is the class containment predicate. The proposition "Aristotle taught philosophy" has a process "to teach" on the entity "philosophy".

The quantifier is just one individual named Aristotle which references a man named Aristotle. So, an atomic proposition should contain a class, a predicative class or a predicative process, an applicable quantifier, name, and its reference. This is needed because both syntactic and semantic scope ambiguities are resolved through proper delimitation of class boundaries in containment or processes, proper use of quantifiers, and proper predicate connectives.

The validity of a propositional argument depends on the form of the argument and the truth of its premises. Validity of the form depends on the possibility of inferential connection - that is something that follows from, originates from. The intellect may understand such inference from science or how it has undergone psychological association or from innate cognitive abilities.

The fallacy occurs when the conclusion doesn't follow from the premise which happens due to irrelevance of the premises, its weakness in support of the conclusion, and ambiguity [18].

4.2.4. Mathematics

The mathematical proposition is either a definition in terms of unambiguous symbols, theorems, or a formula. All mathematical propositions must be reducible to the most basic of axioms which our intellect -the rational part - just accepts as true. The mathematical proposition is applied to entities or members who form a class or set. All of the mathematics thus consist of sets of classes on which mathematical rules are applied and these rules are called functions of sets. It can be compared with linguistic grammar on an alphabet of the language where grammar is the function and alphabet are the set. The relevancy here is that our conscious or unconscious cognitive processes are functions that work on set of data whether empirical or abstract mental. The inference is also the core pillar of mathematical truth value apprehension. Mathematics achieves this through precise clear proof methods which are the mathematical equivalence of logical deduction.

4.2.5. Computational Model

This can be regarded as a subcategory of logical thought. Today new cognitive rules called computational thinking have emerged which consists of abstraction, pattern matching, pipelining data and processes, and sorting and searching based on well-defined algorithms [24].

The inference is also the heart of all these computational processes. In abstraction, the mind uses inference from generalization to specification, class creation on generalization, and its delimitation [20] through encapsulation and modifying or manipulating the class attributes. Pattern matching [21] also uses inference on the basis of a mathematical rule or computational state transformation. Such computational state transformation is either defined a priori or identified as a posteriori. Pipelining in relation to the rational-empiric model is a cognitive process of organizing and sequencing information and reasoning based on some algorithm. Pipelining [22] is one of the most important measures of one's cognitive ability and utilization of the rational-empiric model.

4.2.6. Empiric Model

The underlying method of this model is the scientific method. The scientific method studies whatever the sensory faculties can access in the creation provided such access gives us deterministic or probabilistic results. The scientific method studies all dimensions recognized by physics and these dimensions create architectural ontologies with variables, processes, and laws working under certain conditions and constraints. A single process of a dimensional ontology is simply the interaction of one or more variables with either all or any of periodicity, synchronicity, asynchronicity, or causality. The purpose of the scientific method is to establish proof or evidence for its hypothesis through any or all observation[5], experiment[6], measurement[7],

falsification[8], or verification[9]. The scientific method works on two levels: the reductionist approach which explains the hypothesis in terms of simple most basic concepts and the holistic approach which explains the hypothesis through a vast number of interconnected ontologies or a single ontology in its total existence [23].

5. Conclusion

The rational empiric model is a functional aspect of the intellect expressed through the structure of the human brain. It is what makes man superior to all other living organisms. This model is utilized to understand both divine truths and creational truths which have their relevant ontologies. The rational empiric model has two parts: the rational part and the empiric part both work in synergism, complement each other, and have their epistemic constituents. The rational empiric model is geared for accuracy because this is both a demand of divine design and human survival on correct information, true knowledge, and scientific truths.

The rational empiric model must first generate a proposition or set of propositions from the existence through any or both its constituent parts such as through linguistic rules, logical rules, mathematical rules, computational rules, and/or the scientific method to ascertain the truth value or arrive at new truth value all through many levels of inferencing. All these are possible due to our cognitive psychological ontology.

6. Recommendation

The rational empiric model is to be developed using psychological science to discover more dimensions of the functional intellect and structural brain so that man can continue to discover and gain deeper knowledge about ontologies.

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[5] Clear identifiable variables in an observed architecture, apparent process and/or potential law.

[6] Testable, generalizable, predictive, replicated with different experiments with same results, repeated in same experiment different data with same results

[7] Uses instrument, mathematics. When capturing contexts all relevant quantifiable information should be taken and what quantifiable data is missing should also be considered.

[8] Mathematical, experimental or observational methods such that for example inconsistent results are produced or that results do not support the theory.

[9] Testable, replicated with different experiments with same results, repeated in same experiment different data with same results

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