Mathematics and life goals have the same source – nature

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Abstract

Humanity has created mathematical and physical descriptions of the universe that aid survival. Emergent philosophy can be used to develop better models of universe fundamentals. Mathematics and physics observations confirm models through experiment and measurement. Still outside the deterministic knowledge are consciousness, aims, and intention. These concepts are part of humanity and part of the universe. Currently, these concepts require useable definitions. By applying more useable definitions guided by emergent philosophy, such concepts may yet be described by mathematics. Because a single universe exists, a single Theory of Everything exists involving causal relations from the very small to the very large and involving the cause of society's success and life's consciousness.

1 INTRODUCTION

Humanity has created mathematical and physical descriptions of the universe that aid survival. But mathematics and physics have limited ability to describe and predict events. Concepts outside those limits are considered with vague and poorly defined concepts. Consciousness, aims, and intentions are such concepts. Without such a definition, the discussion must be vague, subject to many interpretations, and, therefore, useless.

This paper suggests the universe is deterministic. Therefore, emergent philosophy and different definitions can yield useful mathematics. Section 2

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discusses emergent philosophy. Section 3 outlines the emergence of life. Section 4 lists the basics of mathematics. An example is given in section 5. The discussion and conclusion is in section 6.

2 Emergence

Emergence philosophy was derived from observations of biology, life, and societies (Hodge 2016). It is also valid in the a-biological world. Within each level of organization of the universe such as atoms there is a more elementary level such as electrons and nuclei. The same can be said of the cosmological scale, classical scale, and the quantum scale. The relation of the agents such as electrons of a level and the emergent level entity such as atoms follows the philosophical idea and rules of emergence philosophy (emergence principle). The emergence principle is a general property of the universe. An emergent property is one that is not a property of the agent level and is a property of the emergent level (Sapolsky 2016).

An unmodeled emergent condition is ontologically present when features of the universe are not reducible to the models of fundamental agents and when the models suggested are not looking for the agents in the emergent scale universe. A more useful model can be obtained by applying emergent theory to the more fundamental level. This implies applying a deterministic perspective to replace the probability arguments.

An unmodeled emergence condition is epistomatically present when model predictions of experiments fail or when the methods applied to one scale fail to apply to the reduced size scale. That is, when causal reductionism fails or a "probability" exercise without a clear causal model of the agents of the next lower level (such as Quantum Mechanics) is used. Generic atomism models failure is attributed to lack of knowledge or the predictions required are too complex. However, a change in the model of the agents, the properties of the agents, and the causes of the emergent entities can develop simpler rules and remove the necessity of a probability treatment. The introduction of a new agent has historically resulted in major advances in scientific models.

The emergent entity: (1) is composed of the agents, (2) is novel (much different than the agent and composed of many of the agents), (3) is a single, autonomous entity from which complexity occurs, (4) involves some element of holism, and (5) follows simple rules from which the emergent entity converges to follow new rules.

Convergence requires the entities have an attraction (addition) and repulsion (subtraction) system and have random (within our measurement ability) wandering ability. Convergence requires some form of selection or death of those structures that are not stable for the system to evolve. Being stable requires a form of more efficient packing. That is, one of the rules is a fractal (scale–free and self similar) universe because the fractal systems solve the packing problem[1]. The local universe of galaxies is evolving toward denser packing. However, the universe of many local regions and the emergence requirement for convergence suggests some locals must be in an "attraction" (adding agents) mode and other locals must be in a repulsion (removing agents) mode. A gradient of an agent in the local region is required. The action is between local agents; indeed, by contact. Stability also requires that a negative feedback situation exists among the various entities and processes. Otherwise the new entities will decay over time. Examples include covalent bonding in chemistry and entanglement in Quantum Mechanics.

The "arrow of time" develops because of the selection of entities. Once a possible entity is selected against, it cannot be recreated by reduction. There is no going back.

Reductionism and emergence have been suggested to yield different models because reductionism holds the whole entity is a sum of the parts. Generic emergence holds the whole is greater than the sum of the parts. If reductionism fails, it fails because the agents are modeled incorrectly. The entities and their characteristics in a given level of organization are the result of emergence and, therefore, are inappropriate to model the reduced level. Hence, the searching for agents should be for different properties that can form the emerged entities.

Humanity is the more complex structure.

3 Emergence of life

Physics models the combination of chemicals to form basic chemicals of life. But why does the universe select life combinations?

Consider matter such as hydrogen and rocks at the edge of a spiral galaxy's gravitational potential. Farther means the material is not rotationally bound. This material is going to intergalactic space and ultimately

[1]Packing greater amount of energy into smaller spaces such as transition of hydrogen gas into black holes.

to an elliptical galaxy. Some that are too hot are ejected to be cooled in the "cooling flow" (Binney and Merrifield 1998).

Other matter is attracted back into the spiral galaxy to form suns and heavier elements as evidenced by the metallicity - radius relation. The condition is similar to the cooling flow because the action is to emit radiation and thus cool the material and to increase entropy. If the agents can combine in such a way to increase the rate of entropy growth, these entities will be selected for survival. Thus, DNA and the life processes are preferred by the emergence principle.

4 Basics of mathematics

Mathematics is a distinctly human endeavor. One of the first things we perceive after birth is that we perceive. The universe sends signals to us such as light, sound, and pressure. Some animals have senses to perceive magnetic fields, electrical fields and other bands of light and sound. This leads to the ability to perceive discrete objects. We can trigger muscle movement resulting from the input sensor data and compare that with prior data and with a goal of survival - we can react. The structure of a brain and sensors allows this structure to reproduce and to survive.

Our perception of the universe and our perception mechanism forms the core of what our models can be. Instruments aid us in measurement of signals that are undetected by our senses and of both larger and smaller scales than our scale of 10^{-3} m to 10^{3} m. Human measure is $10^{\pm 3}$ of a standard in our perception range. Scales beyond this range such as quantum mechanics become stranger to us as the range expands. However, mathematics applies at all scales. This is the fractal nature of the universe.

The ability to recognize discrete objects and events allows us to recognize one object, two objects, etc. Counting has begun. We recognize one object and (plus) another object produces the recognition of two objects. Operations have begun. When objects are combined the combination creates a new object and the idea of equality and comparing. Counting, operations, equality, and comparing create algebra.

We learn to recognize objects in space and note a distance between them. Physics models suggest objects such as trees are composed of molecules that are tightly bound. But our observation within our scale is that an object is continuous and coordinated. Shapes become lines, surfaces, and volumes.

Geometry has begun.

Geometry talks of extended objects. A point can exist in the extended object. Descartes considered the continuous as infinitely divisible. However, a geometrical object is not composed of an infinite number of points. We can say an object is at a point or not. We could change scale and still talk of integer objects. Hence, an object has a boundary. The boundary at our scale seems firm and distinguishable. The boundary at smaller scales is less distinct. Determining if a subatomic particle in part of the object becomes difficult. But the subatomic particle appears to have a boundary. Mathematics is able to deal with the continuum and an object at ever–smaller scales.

Mathematics treats algebra and geometry as mutually exclusive. Trigonometry was created to combine algebra and geometry.

Division presents a quandary in both discrete mathematics and continuous math. We can take 1 ft. and multiply by 3 and make a yard. But we cannot always take a thing and make 1/3 of the thing by a scale change. There is no such point of 1/3 on a line. Division is a transformation operation and may yield an unreal result in physics.

Mathematics perceptions have difficulty dealing with analog variation and extendedness in a discrete description. Thus physics developed the idea of standards of measurement for turning analog physics into counting physics. A physics standard is assumed to be repeatable and invariant or, at least, varies less than the tolerance of the experiment. Commonly accepted standards allow several experimenters to compare results. The relation of objects created the need for proportionality constants. Some of these appear to be universal constants.

The relation of objects over duration created the need for causation. This further created the idea of mapping or mathematical transformation. The latter has triggered many arguments about the reality of the parameters on the transformed side of the equation such as a wave in Quantum Mechanics and space–time in General Relativity. The number models are often abstractions that yield non-physical results such as infinity, singularities, and negative numbers. These concepts are difficult to use in mathematics and in the universe.

Human mathematics has recently discovered fractal math. Fractal mathematics has existed in nature such as tree branching and natural landscapes.

Mathematics that we use developed out of the physics of the universe. Therefore, mathematics is part of the physics of the universe.

Mathematics is deterministic. Given an equation and the initial data, a definite result is calculated. This implies that the universe is deterministic. If there is free–will, then the mathematics humans have developed needs a new function like fractal development or a model of the mechanism of apparent free–will is needed.

5 Example of emergence from philosophy to mathematics

Physics in Aristotle's time modeled the universe as being several crystal spheres. The outer sphere was the heavens with stars. The wandering stars (planets) with different rates of movement were each on their own crystal sphere. Crystal spheres because it provided a physical support while allowing light to passing through without being affected[2]. The stars were clear. Because different planets showed different retrograde motion or no retrograde motion, each crystal sphere had their own physics. The Earth was *at* the center of the universe. The Earth was not *the* center of the universe.

A piece of matter (rock) moved from one sphere to an inner sphere because it was rejected from the higher/outer sphere. It was rejected because it lacked the physics of the outer sphere. The rock was seeking its natural position. A rock rejected by all the spheres sought its natural position, which was *at* the center of the universe. The Earth became the garbage pile of the more heavenly spheres.

If rocks had aims and intentions to seek its natural position, certainly mankind had a consciousness, aims, and intentions. Mankind was on the garbage pile of the heavens. Those actions that were consistent with their position on the garbage pile succeeded in gaining the riches of Earth. However, if the aim was to go back to the heavens, the actions had to consistent with the physics of the crystal spheres. The physics were unknown except that the actions that gained Earthly rewards were wrong. Several religious dogmas derived from this universe model. The physics of the stars and planets were considered to have no application on Earth; indeed, the physics was unknown.

Sir Isaac Newton suggested gravity rather than a rock's intentions di-

[2]Does this remind of "Dark Matter" that holds the rotation curves and does not modify light?

rected its path. The rocks formed the gravity field such as suggested by General Relativity. The gravity field (Space) then directed the rocks. Or we might say the rocks sensed the gravity field and moved according the gradient. This change in semantics may be the root of defining consciousness. Newton changed the physics of falling rocks and planets to mathematics that allowed humans to predict events much more accurately. Predictability enhances survival of rocks, plants, animals, and humans. That is, Newton changed the semantics and phrasing of the problem consistent with the emergence principle to allow a mathematical description.

Newton's causation model is simpler and more useful. It brings the idea that the physics found on Earth is the same physics throughout the universe. Distant galaxies can radiate light that has the same physics as on Earth such as redshift. Therefore, cosmological observations are applicable to Earth.

6 Discussion and Conclusion

Conscience and its aims and intentions may be another emergent property from the neuron agents. The idea of the "grandmother" neuron has been disproved. The growth (evolution) functioning of the neural nets and bundles may provide the mechanism of consciousness in deterministic terms (Sapolsky 2016). The simple rules need to be identified. Additional concepts such as fractal structures and negative feedback loops from the emergent principal that describe the universe are also helpful.

Emergent agents and their simple rules of behavior form more complex entities and behaviors. The relation between the agents and the emerged entities is causal. Therefore, because a single universe exists, a single Theory of Everything exists involving causal relations from the very small to the very large and involving the cause of society's success and life' consciousness.

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