Simulation Argument (Programmer God)

Subjects: Others
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The simulation hypothesis or simulation theory is the proposal that all of reality, including the Earth and the rest of the universe, could in fact be an artificial simulation, such as a computer simulation. Neil deGrasse Tyson put the odds at 50-50 that our entire existence is a program on someone else's hard drive . David Chalmers noted "We in this universe can create simulated worlds and there's nothing remotely spooky about that. Our creator isn't especially spooky, it's just some teenage hacker in the next universe up. Turn the tables, and we are essentially gods over our own computer creations . The commonly postulated ancestor simulation approach, which Nick Bostrom called "the simulation argument", argues for "high-fidelity" simulations of ancestral life that would be indistinguishable from reality to the simulated ancestor. However this simulation variant can be traced back to an 'organic base reality' (the original programmer ancestors). The Programmer God hypothesis conversely states that the simulation began with the big bang and was programmed by an external intelligence (external to the physical universe), the Programmer by definition a God in the creator of the universe context.

Keywords: the big bang ; simulation theory ; simulation hypothesis

1. Discussion

The Mathematical universe hypothesis states that *Our external physical reality is a mathematical structure*.[1] That is, the physical universe is not merely *described by* mathematics, but *is* mathematics (specifically, a mathematical structure).

The principle constraints to any mathematical universe simulation hypothesis are;

1. the computational resources required. The ancestor simulation can resolve this by adapting from the virtual reality approach where only the visible region is simulated and only to the degree required, and

2. that any 'self-aware structures' (humans for example) within the simulation will "subjectively perceive themselves as existing in a physically 'real' world".[2].

2. Planck Scale

The Planck scale refers to the magnitudes of space, time, energy and other units, below which (or beyond which) the predictions of the Standard Model, quantum field theory and general relativity are no longer reconcilable, and quantum effects of gravity are expected to dominate (quantum gravitational effects only appear at length scales near the Planck scale). Consequently any study of a deep universe simulation must consider (if not begin at) the Planck scale.

2.1. Dimensioned Quantities

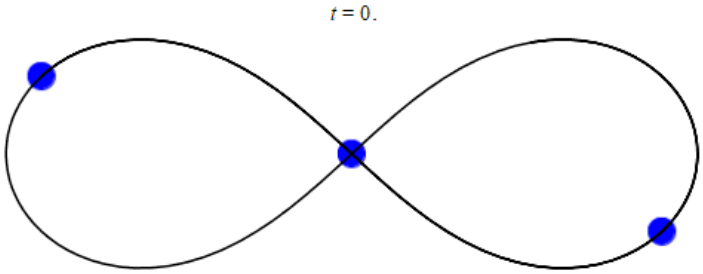
A fundamental physical constant is a physical quantity that is generally believed to be both universal in nature and have a constant value in time. These can be divided into dimension-ed (with units kg, m, s ... ; speed of light c, gravitational constant G, Planck constant h ...) and dimension-less (units = 1, such as the fine structure constant α). There are also dimension-less mathematical constants such as pi.

The SI units mksa units are; meter (length), kilogram (mass), second (time), ampere (electric current). The corresponding mksa Planck units are Planck length, Planck mass, Planck time, Planck charge.

Physicist Lev Okun noted "Theoretical equations describing the physical world deal with dimensionless quantities and their solutions depend on dimensionless fundamental parameters. But experiments, from which these theories are extracted and by which they could be tested, involve measurements, i.e. comparisons with standard dimensionful scales. Without standard dimensionful units and hence without certain conventions physics is unthinkable. [3].

Successful implementation of a Planck scale simulation would therefore require that the programmed (dimension-less) mathematical structures for mass, space and time be indistinguishable from the (dimensioned) 'physical' units for mass, space and time as observed from within the simulation.

2.2. Determinism



An animation of the figure-8 solution to the three-body problem over a single period T ≃ 6.3259 [4]. https://handwiki.org/wiki/index.php?curid=1651849

Particles form more complex structures such as atoms and molecules via a system of orbitals; nuclear, atomic and gravitational. The 3-body problem is the problem of taking the initial positions and velocities (or momenta |momentum|momenta) of three or more point masses and solving for their subsequent motion according to Newton's laws of motion and Newton's law of universal gravitation.[5]. Simply put, this means that although a simulation using gravitational orbitals of similar mass may have a pre-determined outcome, it seems that for God's and men alike the only way to know what that outcome will be is to run the simulation itself.

3. Programming Structure

> “God vs. science debates tend to be restricted to the premise that a God does not rely on science and that science does not need a God. As science and God are thus seen as mutually exclusive there are few, if any, serious attempts to construct mathematical models of a universe whose principle axiom does require a God. However, if there is an Intelligence responsible for the 14 billion year old universe of modern physics, being the universe of Einstein and Dirac, and beginning with the big bang as the act of 'creation', then we must ask how it might be done? What construction technique could have been used to set the laws of physics in motion?”[6]

3.1. Numbering Systems

As well as our decimal system, computers apply binary and hexadecimal numbering systems. In particular the decimal and hexadecimal are of terrestrial origin and may not be considered 'universal'. Furthermore numbering systems measure only the frequency of an event and contain no information as to the event itself. The number 299 792 458 could refer to the speed of light (299 792 458 m/s) or could equally be referring to the number of apples in a container (299 792 458 apples). As such numbers require a 'descriptive', whether *m/s* or *apples*. Numbers also do not include their history, was 299 792 458 for example a derivation of base numbers?

Present universe simulations use the laws of physics and the physical constants are built in, however both these laws and the physical constants are known only to a limited precision, and so a simulation with 10^{62} iterations (the present age of the universe in units of Planck time) will accumulate errors. Number based computing may be sufficient for ancestor-simulation models but has inherent limitations for deep universe simulations. The actual computational requirements for a Planck scale universe simulation based on a numbering system with the laws of physics embedded would be an unknown and consequently lead to an 'untestable' hypothesis. This is a commonly applied reasoning for rejecting the deep universe simulation.

3.2. Geometrical Objects

A number such as π refers to a geometrical construct rather than any numbering system and so may be considered universal and defined as a constant. Likewise, by assigning geometrical objects instead of numbers to the Planck units, the problems with a numbering system could be resolved. These objects would however have to fulfill the following conditions, for example the object for length must;

1. embed the function of *length* such that a descriptive (km, mile ...) is not required

Electron wavelength would then be measurable in terms of the length object, as such the length object must be embedded within the electron. Although the mass object would incorporate the function *mass*, the time object the function *time* ..., it is not necessary that there be an individual physical mass or physical length or physical time ..., but only that in relation to the other units, that object must express that function (i.e.: the mass object has the function of mass when in the presence of the objects for space and time). The electron would then be a complex event constructed by combining the objects for mass, length, time and charge into 1 event, and thus electron charge, wavelength, frequency and mass would be different aspects of that 1 geometry (the electron event) and not independent parameters (independent of each other).

The objects for mass, length, time and charge must therefore be

2. be able to combine with other objects (for mass, time, charge ...) to form more complex objects (events) such as particles and apples whilst still retaining the underlying information (the individual objects that combined to form that event)

3. combine in such a ratio that they cancel whereby the sum universe itself (being a mathematical universe) is unit-less. While internally the universe has measurable units, externally (seen from outside the simulation) the universe has no physical structure.Not only must these objects be able to form complex events such as particles, but these events themselves are geometrical objects and so must likewise function according to their geometries. Electrons would orbit protons according to their respective electron and proton geometries, these orbits the result of geometrical imperatives and not due to any built-in laws of physics. As orbits follow regular and repeating patterns, they can be described using mathematical formulas. As the events grow in complexity (from atoms to molecules to planets), so too will the patterns (and so the formulas then used to describe them). Consequently the *laws of physics* would then become mathematical descriptions of the underlying geometrically imposed patterns. The computational problem could thus be resolved by instituting a geometrically autonomous universe.

Furthermore, as the sum universe is unit-less, there is no limit to the number of objects (size, mass, age ... and so the information content that can be stored and manipulated). If the 'Programmer' can determine appropriate geometrical objects that satisfy the above and also include a mechanism for the addition of further objects, then a universe could 'grow' accordingly.

There is a caveat; self aware structures within the simulation will perceive a physical mass, space and time as forming their physical reality, these mathematical objects must therefore be indistinguishable from any observed physical reality.

3.3. Simulation Clock-Rate

The simulation clock-rate would be defined as the minimum 'time' **age** increment to the simulation. It may be that Gods use analog computers, but as an example;

```
 'begin simulation FOR age = 1 TO the_end 'big bang = 1 conduct certain processes
........ NEXT age 'end simulation
```

Quantum spacetime and Quantum gravity models refer to Planck time as the smallest discrete unit of time and so the incrementing variable **age** could be used to generate units of Planck time (and other Planck units), for example;

```
 FOR age = 1 TO the_end 'age is a dimensionless variable generate 1 time object T 'T
is a dimensioned unit of time generate 1 mass object M 'M is a dimensioned unit of
mass generate 1 length object L 'L is a dimensioned unit of length ........ NEXT age
```

The variable *age* is the simulation clock-rate (the universe age). If *age* is the origin of Planck time (the time object T) then *age* = 10^{62}, the present age of the universe measured in units of Planck time.

For each *age*, certain operations are performed, only after they are finished does *age* increment. As such, *age* is a (discrete) incremental variable and not a time dimension, for there is no 'time' interval between increments. Although those operations may be extensive, self-aware structures from within the simulation would have no means to determine this, they could only perceive themselves as being in a real-time. Their dimension of time would be a measure of relative motion and so although ultimately deriving from the variable *age*, it would not be the same as *age*. If there were no

motion, if all particles and photons were still (no change of state), then the observed dimension time could not update, *age* however would continue to increment. The analogy being pressing the pause button on a movie, this would not affect the computer clock-rate itself.

3.4. Expanding Universe

By adding mass, space and time objects with each increment to the simulation **age**, the universe would grow in size and mass accordingly resembling a black hole (black hole cosmology), thus dispensing with the requirement for a 'dark energy'. As the universe scaffolding includes objects for mass M, 'dark matter' could correspond to the underlying fabric of the universe itself (a vacuum may indicate an absence of particle matter but not an absence of universe).

As the universe expands in size per increment to **age**, this expansion could also be used to 'pull' particles with it. Thus this expansion could serve the purpose of introducing momentum into the simulation, the expansion being the origin of particle motion (this would restrict the permitted topologies of the simulation). The expansion of the particle universe would not be the same as this expansion, although it would be driven by this expansion.

The velocity of expansion would be the maximum attainable velocity and so the origin of the speed of light **c** (to go faster than this velocity would mean leaving the simulation itself). thus both the velocity of expansion (and so **c**) and the incrementing variable **age** (and so Planck time) are constants.

The forward increment to **age** would constitute the arrow of time. Reversing this would reverse the arrow of time, the universe would likewise shrink in size and mass accordingly (a white hole is the (time) reverse of a black hole).

```
 FOR age = the_end TO 1 STEP -1 delete 1 time object T delete 1 mass object M delete 1
length object L ........ NEXT age
```

3.5. Universe Time-Line

As the universe expands and if the data storage capacity expands proportionately, then the 'past' could be retained.

```
  FOR  age  =  1  TO  the_end  ........  FOR  n  =  1  TO  total_number_of_particles  SAVE
particle_details{age, particle(n)} NEXT n NEXT age
```

Because particles are pulled along by this expansion, previous information is not over-written by new information. The analogy would be the storing of every keystroke. This also forms a universe **time-line** against which previous information can be compared with new information (a 'memory' of events).

Time travel

As the simulation data is stored in entirety (a Planck scale version of the Akashic records), the simulation can be replayed. We could even speculate that if mankind made a bad 'move', such as initiating a nuclear war, it may be possible to rewind the simulation clock back to a period prior to that move and reset the simulation. All future events from that point in time would then be over-written. Time-travel (travelling backwards in time) for an individual may not be possible but for the entire universe it is.

4. Mathematical Structures

Physicist Eugene Wigner (The Unreasonable Effectiveness of Mathematics in the Natural Sciences) [7]

> The miracle of the appropriateness of the language of mathematics for the formulation of the laws of physics is a wonderful gift which we neither understand nor deserve.

The following describes how a geometrical approach to a Planck scale deep universe simulation could be implemented.

4.1. Mass, Length, Time, Charge

Here geometrical objects are assigned to units mass **M**, length **L**, time **T**, ampere **A**. For a simulated universe to be unit-less, the units must be able to cancel within a certain ratio such that in sum total there is no physical universe (when seen from outside the simulation, the universe is merely a data set on a celestial hard-drive). In the following table are

illustrated objects **MTLA** in terms of 2 dimensionless physical constants; the fine structure constant **α** and Omega **Ω**, and to fulfill the above condition, the mathematical relationships (**u^n**) between them [8]. These objects correspond to the Planck units.

Geometrical units

Attribute	Geometrical object	Relationship
mass	$M = 1$	$unit = u^{15}$
time	$T = 2\pi$	$unit = u^{-30}$
length	$L = 2\pi^2\Omega^2$	$unit = u^{-13}$
velocity	$V = 2\pi\Omega^2$	$unit = u^{17}$
ampere	$A = \frac{2^6\pi^3\Omega^3}{\alpha}$	$unit = u^3$

The unit relationships show how these units interrelate to each other. In a particular ratio they will overlap and cancel, for example, if the universe 'scaffolding' is a construct of **$(AL)^3$** and **T** then the sum universe is unit-less (there is no physical universe).

$$\frac{u^{3^3}u^{-13^3}}{u^{-30}}\ (\frac{ampere^3\ length^3}{time}) = \frac{u^{-13^{15}}}{u^{15^9}u^{-30^{11}}}(\frac{length^{15}}{mass^9\ time^{11}}) = 1$$

Embedded within the electron are these objects for mass, length, time, charge **MLTA** hence we can measure the parameters of the electron; electron mass, wavelength, frequency and charge, however the electron itself reduces to the following formula **f_e**, it has no measurable units (they overlap and cancel) and so the electron itself it does not exist in any physical dimension, yet the physical universe is seemingly a construct of electrons. What actually defines our physical universe are those parameters, the electron itself (this mathematical formula f_e) dictates how the MLTA objects are arranged into those parameters.

$$f_e = 4\pi^2(2^6 3\pi^2\alpha\Omega^5)^3 = .23895453...x10^{23},\ units = 1$$

By this artifice, although the 'physical' universe is constructed from particles (particle matter), particles themselves are not physical, they are mathematical.

4.2. Null Universe

If the universe expands per increment of **age** by adding units of mass, space and time, and if these units overlap and cancel, then the sum universe is unit-less. This also means that to make time (which adds object time **T**) we must also make an equivalent of **MLA** to balance this ratio, and so to create time, the time required to read this sentence for example, the universe had to grow larger (add space) and more massive (add mass). Likewise, if time went backward the universe would have to shrink in size and mass. But regardless of the age of the universe, if we combine all the mass, space and time within, the universe would disappear (units = 1). Seen from the outside, there is no universe.

4.3. Relativistic Universe

The mathematics of perspective is a technique used to project a 3-D image onto a 2-D screen (i.e.: a photograph or a landscape painting), using the same approach here would implement a 4-axis hypersphere universe structure in which 3-D space is the projection [9].

The expanding universe approach can also be used as a method to replace independent particle motion with motion as a function of the expansion itself, this expansion generating the universe time-line. In the mass point-state the particle would have defined co-ordinates and so all particles simultaneously in the point-state per unit of **age** may be measured relative to each other. As photons (electromagnetic spectrum) have no mass state, they cannot be pulled along by the universe expansion (they are date stamped, as it takes 8 minutes for a photon from the sun to reach us, that photon is 8 minutes old) and so photons would have a lateral motion within the hyper-sphere. Visible 3-D space then becomes a projected image from the 4-axis hyper-sphere, the relativity formulas are used to translate between the hyper-sphere co-ordinates and 3-D space co-ordinates [10].

In hyper-sphere co-ordinate terms; **age** (the simulation clock-rate), and velocity (the velocity of expansion as the origin of **c**) would be constants and thus all particles and objects would travel at, and only at, $V = c$, however in 3-D space co-ordinate terms, time and motion would be relative to the observer. The time dimension of the observer measures the change in state = change of information = change in relative position of particles in respect to each other and thus derives from, but is not the same as, the expansion clock-rate **age** or object time **T**, for in the absence of motion there is no means for the observer to measure either, **age** however would continue to increment (the universe hyper-sphere would continue to expand at the speed of light).

4.4. Gravity

All particles simultaneously in the point-state at any unit of **age** form gravitational orbital pairs with each other [11]. These orbital pairs then rotate by a specific angle depending on the radius of the orbital. Furthermore the orbital plane also rotates. The results are then summed and averaged and so the entire universe can be updated in real time (before the next increment to *age*). The observed gravitational orbits of planets are the sum of these individual orbital pairs averaged over time. Thus it is in principle not necessary to have direct information regarding the orbiting objects in order to calculate their respective orbits [12].

Orbits, being also driven by the universe expansion, occur at the speed of light, however the orbit along the expansion time-line is not noted by the observer and so the orbital period is measured using only 3D space co-ordinates.

4.5. Singularity

In a simulation, the data (software) requires a storage device that is ultimately hardware (RAM, HD ...). In a data world of 1's and 0's such as a computer game, characters within that game may analyze other parts of their 1's and 0's game, but they have no means to analyze the hard disk upon which they (and their game) are stored, for the hard disk is an electro-mechanical device, is not part of their 1's and 0's world, it is a part of the 'real world', the world of the Programmer. Furthermore the rules programmed into their game would constitute for them the laws of physics (the laws by which their game operates), but these may or may not resemble the Laws that operate in the 'real world', assuming there even exist such laws. Thus any region where the laws of physics (the laws of the game world) break down would be significant. A singularity inside a black hole is such a region.

For the black-hole electron, the mass point-state would then be analogous to a storage address on a hard disk, the interface between the simulation world and the real world, a massive black-hole as a data sector.

The surface of the black-hole would then be of the simulation world, the size of the black hole surface reflecting the stored information, the interior of the black-hole however would be the interface between the data world and the real world, and so would not exist in any 'physical' terms. Thus we may discuss the 3D surface area of a black-hole but not its volume (interior).

5. Laws of Physics

The scientific method is built upon testable hypothesis and reproducible results. Water has always boiled, under identical conditions, at 100°C. In a geometrical universe particles behave according to geometrical imperatives, the geometry of the electron and proton ensuring that electrons will orbit nuclei in repeating and predictable patterns. The laws of physics would then be a set of mathematical formulas that describe these patterns, the more complex the orbits, the more complex the formulas required to describe them and so forth. If there is a source code from which these geometrical conditions were programmed there there may be non-repeating events, back-doors built into the code, these by definition would lie outside the laws of physics and so be labelled as miracles, yet they would be no less valid.

6. Purpose

Any simulated universe, whether a simple computer game or NASA program, may presume a 'purpose', that the simulation, being the result of an 'intelligent design', is intended for an 'intelligent reason'. We cannot judge the motives of the Programmer God, however in theological texts we do find a common thread and that is the battle between Good and Evil and so this may be taken as an example.

Zoroastrianism is one of the world's oldest continuously practiced religions. It is a multi-faceted faith centered on a dualistic cosmology of good and evil and an eschatology predicting the ultimate conquest of evil. The opening chapters of the Book of Genesis provide a mythic history of the infiltration of evil into the world. God places the first man and woman (Adam and Eve) in his Garden of Eden, from whence they are expelled.

As noted above, embedded within the electron are the objects for mass, length, time, charge MLTA hence we can measure the parameters of the electron; electron mass, wavelength, frequency and charge, however the electron itself has no measurable units, it does not exist in any physical dimension. We may draw an analogy with Evil, whose parameters are the emotions it generates [13].

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