

1c: The Heavens and the Free-Will postulate

Part 3 of a three-part series on the Simulation Hypothesis

Preamble: The Question This Part Addresses

The electron ψ_e oscillates between a (non-determined) wave-state (duration of the electron's frequency cycle) and a (Planck) mass point-state (duration 1 unit of Planck time). It exists as a particle only *within* the universe ψ_{univ} : its mass, charge, and Compton wavelength are properties conferred by the universe, not intrinsic to the electron alone. The Tau scale is also an oscillatory example that collapses into a unit of Planck time. The natural question follows:

If the universe ψ_{univ} oscillates, does it too exist as a particle within some greater realm ψ_H , and eventually will it also collapse into a point-state? And if so, what would the physics *inside* ψ_H look like?

In ancient Greek philosophy, the heavens were defined as a divine, perfectly ordered, and eternal spherical realm.

A note on the word “particle.” Throughout this article, “particle” means specifically: *a bounded state within the next enclosing wavefunction*. This is a minimal, formal criterion — it does not by itself imply that the bounded state behaves dynamically like the electron, carries analogous quantum numbers, or admits the same cyclic description. Whether a given bounded state satisfies the *stronger* sense of “particle” — a genuine, context-independent invariant, as ψ_e turns out to be — is a separate question. The philosophical framework developed in Section 2 finds that ψ_{univ} , while a bounded state in the formal sense, does *not* satisfy the stronger sense. The two senses are not assumed to coincide.

Section 1 compiles the mathematical consequences of extending the oscillation lattice to $n = 3$. Section 2 develops the philosophical framework. It is assumed the reader is familiar with the preceding articles in this series.

1. Mathematical Structure

1.1. Table of constants

This table was introduced in Article 1b (The Minimal Complexity Algorithm of the Planck Scaffolding [4]). For reference it is also included here; for derivation refer to

Article 1b. We may consider mass M , time T and (sqrt) momentum P as the primary Planck units, as from these we can construct the other units, and from the Planck units we can derive the more familiar physical constants G , h , e , m_e , k_B ...

Attribute	Quantity	Object	Scalar	u^θ	unit
mass	M	(1)	$\frac{r^4}{v^9}$	u^{15}	kg
time	T	(π)	$\frac{r^9}{v^6}$	u^{-30}	s
sqrt momentum	P	(Ω)	r^2	u^{16}	$\sqrt{\frac{kg\ m}{s}}$
velocity	V	$\frac{2\pi P^2}{M} = (2\pi\Omega^2)$	v	u^{17}	$\frac{m}{s}$
length	L	$VT = (2\pi^2\Omega^2)$	$\frac{r^9}{v^5}$	u^{-13}	m
charge	A	$\frac{2^4 V^3 \alpha}{P^3} = (2^7 \pi^3 \alpha \Omega^3)$	$\frac{v^3}{r^6}$	u^3	$\frac{m^{3/2}}{kg^{3/2} s^{3/2}}$
temperature	K	$\frac{AV}{2\pi} = (2^7 \pi^3 \alpha \Omega^5)$	$\frac{v^4}{r^6}$	u^{20}	$\frac{A\ m}{s}$

Table 1: The θ column is the unit-number invariant [4.2].

1.2. The single anchor principle

The unit-number invariant θ integer solutions for the unit-number exponents ($\theta_P, \theta_T, \theta_M$) required 2 constraints [4]:

$$\begin{cases} 15\theta_P + 2\theta_T - 12\theta_M = 0 \\ 2\theta_M + \theta_T = 0 \end{cases}$$

We note that the constraint $2\theta_M + \theta_T = 0$ occurring as M^2T is unusual in that while the unit number $\theta = 0$, indicating that it is dimensionless, it still has scalars;

$$\frac{1}{M^2T} = \frac{1}{\pi} \times 0.1230016431 \times 10^{60}, \text{ units} = 30 - 30 = 0, \text{ scalars} = \frac{v^8}{r^{17}}$$

From Article 1b [4], a dimensionless constant $f(y) = 0.1230016431 \times 10^{60}$ was proposed as a numerical (geometrical) input alongside the fine structure constant α . The actual formula for $1/M^2T$ becomes **(1/object) $\times$ f(y)**;

$$\frac{1}{M^2T} = \frac{1}{\pi} \times f(y), \text{ units} = 0,$$

Although y is a construct of SI-based scalars, numerically they are equivalent.

$$y = \frac{v^8}{r^{17}} = 0.1230016431 \times 10^{60}$$

This is not because the universe is cognizant of SI units, but rather that $f(y)$ places a boundary on the universe and this therefore will show up in any complete system of units that describes the universe. In this series we have been using the scalars r and

v , this is for pragmatic reasons; they are derived from the 2 physical constants with exact assigned values (c , μ_0). These 2 constants are presumed independent of each other, but in the single anchor principle they are related: as soon as we assign a value for v , then the value for r (and all other scalars) is numerically fixed by $f(y)$.

There is exactly **one** free numerical choice in fixing a unit system—not two. Once 1 scalar is chosen, all other scalars are forced by the fixed (embedded in the source-code) constant $f(y)$. This rule would apply to any civilization, and to any unit system.

The reason earlier articles use 2 scalars (2 anchors) is because we do not know the value for $f(y)$; we can only extrapolate from 2 known scalars, and furthermore this $f(y)$ only has relevance in this supplement article.

By way of illustration, alien civilizations would not use SI units; their speed of light (and other constants) would be calculated in alien units. However, if we could decode their numerical value for the speed of light, we could calculate their value for the velocity scalar v , and once we have that (or any of their scalars decoded), we can then solve all their constants, for their system of units will also be constrained by $f(y)$. This ‘universal language’ would give us a means to communicate.

This resolves an apparent tension. The numerical value 0.123×10^{60} looks like an artefact of SI units — a number that would presumably be different for a civilization using different units. But if $f(y)$ is truly fixed in the source code, this is precisely backwards: the SI numerical value is not an *accident* of unit choice, it is the *constraint itself*, expressed in whichever units a given observer happens to use. Every observer, in every unit system, computing v^8/r^{17} (or any scalar equivalent), would obtain the *same* number—not because the universe favours SI, but because only 1 scalar was free to begin with.

1.3. CMB temperature

From Article 1 (Planck scale CMB [3]), ψ_{univ} ends when the CMB reaches (nears) absolute zero, for then the universe cannot expand further. The Planck temperature is constructed from the lattice quantities as

$$T_p = \frac{AV}{2\pi}, \text{ scalars} = \frac{v^4}{r^6}.$$

The endpoint epoch, expressed in Planck time units, is estimated referencing the fourth power of the reduced Planck temperature:

$$t_{\text{zero}} = \left(\frac{T_p}{8\pi} \right)^4 = 0.10137 \times 10^{124} \text{ (Planck time units)}.$$

To convert to the dimensionless anchor $f(y)$ we include $P = \Omega r^2$ (the square root of momentum). In SI units $P = 1.01911342884 \sqrt{\text{kg.m.s}^{-1}}$, and the endpoint becomes

$$t_{\text{end}} = \frac{t_{\text{zero}}}{P^5} = 0.92217 \times 10^{123} \text{ (Planck time units)}.$$

Expanded in dimensionless form the endpoint reads

$$t_{\text{end}} = 2^{16} \pi^8 \Omega^{15} \alpha^4 f(y)^2 = 0.92217 \times 10^{123}$$

with $\theta = 0$ and numerically scalar $v^{16}/r^{34} == f(y)^2$.

The simulation source code may therefore include the conditional boundary:

IF (CMB_temperature > absolute_zero) THEN ... ELSE break;

1.4. Inside the electron

The basis for this article is largely extrapolated from the electron formula ψ_e which embeds the information required to generate the electron parameters (of charge, mass, wavelength, etc.).

$$\psi_e = 4\pi^2(2^6 \cdot 3\pi^2 \alpha^{-1} \Omega^5)^3 \approx 2.389545 \times 10^{22}$$

The observed electron is determined here as an oscillation between an electric wave-state (duration electron frequency; $2.389545 \times 10^{22} t_p$) to a Planck mass point-state (duration $1t_p$), and is a construct of time T and magnetic monopoles σ_e .

$$T = \pi, \text{ unit} = u^{-30}, \text{ scalar} = t$$

$$\begin{aligned} \sigma_e &= \frac{3\alpha^{-2}AL}{2\pi^2} = 2^7 \cdot 3\pi^3 \alpha^{-1} \Omega^5, \text{ unit} = u^{(3-13=-10)}, \text{ scalars} = t^{1/3} \\ \psi_e &= \frac{\sigma_e^3}{2T} = \frac{(2^7 \cdot 3\pi^3 \alpha^{-1} \Omega^5)^3}{2\pi}, \text{ unit} = \frac{(u^{-10})^3}{u^{-30}} = 1, \text{ scalars} = 1 \\ \psi_e &= 4\pi^2(2^6 \cdot 3\pi^2 \alpha^{-1} \Omega^5)^3 = 2.389545... \times 10^{22}, \text{ unit} = 1 \end{aligned}$$

Up to this point ψ_e has been treated abstractly: an invariant with scalars=1, defined formally as $\sigma_e^3/(2T)$, but without an explicit closed-form number attached.

2.389545×10^{22} is the numerical solution that, by construction, governs the electron's internal oscillation: it is the dimensionless count that dictates the cycle's duration, just as the *geometric* components of σ_e dictate the cycle's internal parameters. The explicit α^{-3} dependence confirms the internal cubic electromagnetic structure already implicit in σ_e^3 .

An observer within the electron cannot see the full electron formula ψ_e , but the monopoles follow a repeating pattern within, and so electron dwellers may have the tools to determine the approximate end of their world. Likewise, observers within our ψ_{univ} can estimate an approximate end of the universe using the CMB temperature as a guide, but this estimate involves SI units.

Being confined within ψ_{univ} we cannot see the full ψ_{univ} formula, but we know this would not include SI scalars. It may therefore be that just as the ψ_e formula embeds the frequency of the electron cycle, so too the ψ_{univ} formula embeds the frequency of the universe cycle.

1.5. The Relative-Level Observation

The appearance of the Ω -sequence suggests a distinction between quantities that are intrinsic to a level and quantities that require a higher level for their expression.

Within the present framework, odd and even powers of Ω appear to occupy different domains. The radiation sector of ψ_{univ} contains the odd powers

$$\Omega^3, \Omega^5, \Omega^{15}, \dots$$

while the mass-space sector contains the even

$$\Omega^2$$

The recurrence of Ω^2 in both the radiation and mass-space constructions suggests that a common invariant may be expressed differently depending on the level from which it is observed.

The fine-structure constant α is treated differently. Unlike Ω , which is *generated* by a τ -loop acting on π, e and so can in principle be regenerated afresh at each level, α has no such generating mechanism anywhere in this construction: it has no clear derivation and so structurally, α is tied to the generator $f(y)$ — the one element common, unchanged, to every level of the lattice. On this basis α remains invariant throughout the hierarchy. Nothing in the present construction requires α to vary between levels, and it is therefore retained as a universal constant.

A useful analogy is provided by the electron. The interior of the electron contains neither explicit mass nor explicit charge; the σ_e monopoles are measured with the scalar t (as is time T), and so an observer within the electron-as-a-universe could experience only the dimension of time. The measurable parameters of the electron are defined only through quantities that belong to the larger universe ψ_{univ} . Mass, charge, and electromagnetic coupling are not properties that can be fully expressed from within the electron alone; they require the higher-level structure represented by ψ_{univ} .

This suggests a broader pattern. If the electron requires ψ_{univ} for the expression of its observable parameters, then it is reasonable to ask whether the observable parameters of ψ_{univ} may themselves require a higher descriptive level, denoted here by ψ_{H} . The recurrence of Ω across both radiation and mass-space domains provides evidence for this possibility.

The argument does not demonstrate the physical existence of ψ_{H} . Rather, it identifies a recurring structural relationship: quantities that appear fundamental at one level may derive their meaning only through a larger enclosing level. α remains a mystery at ψ_{univ} , but it may have a clear geometry at ψ_{H} . The analogy would be observers restricted to a straight 1-D line trying to discern the meaning of π . For them the meaning cannot be discerned, but on a 2-D plane the meaning is readily apparent.

Accordingly, the Relative-Level Observation may be stated as follows:

The measurable properties of a system need not be fully expressible within the system itself. Observable parameters at one level may require a higher descriptive level for their complete definition.

In this interpretation, ψ_H is not introduced as a consequence of changing constants, but as the next candidate level required to express the full parameter set of ψ_{univ} , in the same way that ψ_{univ} is required to express the observable properties of the electron.

Furthermore, if the radiation domain resides primarily within ψ_{univ} , then the odd powers

$$\Omega, \Omega^3, \Omega^5, \dots$$

may be regarded as characteristic of that level, while the even powers

$$\Omega^2, \Omega^4, \Omega^6, \dots$$

could manifest within both ψ_{univ} and ψ_H . The repeated appearance of Ω in both domains as noted above may therefore represent a bridge between adjacent descriptive levels rather than a quantity belonging exclusively to either one.

1.6. Deductions for ψ_H

The level-coupling n postulate

Where $n = 0$ gives the Planck scale, $n = 1$ the midpoint (1K CMB), and $n = 2$ the endpoint (absolute zero), we hypothesise a level $n = 3$ that encloses the entire universe. The following postulate provides the minimal extension:

Level-Coupling Postulate. Each successive level n squares the fine-structure coupling and doubles the mass-time monomial of the previous level:

$$\psi^{(n)} \sim \alpha^{2n} M^{2n} T^n, \quad \theta = 0.$$

The $M^{2n} T^n$ structure is the minimal form preserving $\theta = 0$. For ψ_{univ} ($n = 2$) the endpoint condition carries α^4 because the Planck temperature T_p (geometric coefficient $2^7 \pi^3 \alpha \Omega^5$) is raised to the fourth power (extrapolating from the Planck temperature formulaic approach into ψ_H). The postulate generalises this observation.

The ψ_H wavefunction

Applying the postulate at $n = 3$:

$$\psi_H \sim \alpha^6 M^6 T^3, \quad \theta = 0.$$

The scalar structure follows from $M^6 T^3$:

$$\text{scalar} = \left(\frac{r^4}{v} \right)^6 \left(\frac{r^9}{v^6} \right)^3 = \frac{r^{51}}{v^{24}}.$$

Because $f(y) == v^8 / r^{17}$, we have

$$\frac{r^{51}}{v^{24}} == \frac{1}{f(y)^3}.$$

Thus $f(y)^3$ limits the numerical range of the ψ_H constants, just as $f(y)^2$ limits ψ_{univ} and $f(y)$ limits the midpoint epoch and sets the $M^2 T$ numerical boundary at each closure of the tau loop.

Physical interpretation

The $n = 3$ wavefunction ψ_H stands as one further application of the Planck generator. It is not derived from an independent mechanism; it is the minimal structural continuation of the same base-15 lattice. Whether ψ_H corresponds to a physically real “heaven” is outside the scope of the mathematical construction; the construction only shows that the lattice architecture permits a consistent level $n = 3$ once the level-coupling postulate is adopted.

Note: The tau loop closes every 15 spiral ticks when this condition (or a multiple of it) is met and Planck units appear.

$$\frac{P^{15}T^2}{M^{12}} = \pi^2\Omega^{15} \quad (1)$$

We may ask if some of these generated Planck units are superfluous to ψ_{univ} , and so is this condition also creating additional Planck units for ψ_H . From M, T, P we can create the units V, L, A for ψ_{univ} , however our Table 1 column θ also has spaces for units we do not seem to use, but that could also be generated by surplus M, T, P . P itself for example is not a constant that is referenced or acknowledged in standard physics, but plays an important role here.

1.7. The Grand Plan

To the simulation loop of Article 1b (The Planck scale) [4] we add the level ψ_H . Each increment to t adds one unit of Planck time to the total universe (each “tick” of the simulation clock), so there is a common time $t = \text{now}$ for all levels. As $f(y)^2$ limits the numerical range of the ψ_{univ} constants, $f(y)^3$ limits the range for ψ_H .

The entire simulation—all ψ_τ , ψ_e , ψ_{univ} , and ψ_H processes—runs at each step. The simulation does not decide what to do, or consider these levels independently; it is a geometrically autonomous engine where “all the world’s a stage, and each level plays its part.”

Listing 1: The Universe Simulation Loop with ψ_H

```
// INITIALISE SIMULATION
n = 0; // discrete Planck step index
set_geometrical_objects(alpha); // fine-structure constant
set_geometrical_objects(f(y)); // dimensionless anchor

// Level boundaries (in Planck time units)
t_mid = f(y); // n=1: midpoint , 1 K CMB
t_end = f(y)^2; // n=2: endpoint , absolute zero
t_heav = f(y)^3; // n=3: heavens boundary (postulated)

WHILE (simulation_active) {

    // 1. INTRA-FRAME WAVE-STATE COMPUTATION (tau-loop)
    // The tau-loop is identical on every shell.
    tau = 1;
    WHILE (tau < e) {
        pi_n = update_series_pi(n);
```

```

        e_n = update_series_e(n);
        Omega_n = sqrt((pi_n)^e_n * e_n^(1 - e_n));
        expand_spiral(Omega_n, tau);
        rotate_spiral(Omega_n, tau);
        tau = tau + delta_tau;
    }

    // 2. BOUNDARY COLLAPSE
    // Deposits 1 unit of coordinate mass and advances the tick.
    collapse_wave_state(); // M = 1, orthogonal phase rotation
    n = n + 1;

    // 3. LEVEL-SPECIFIC PROCESSES (all occur simultaneously)
    // Each process is governed by its own wave-function,
    // but they share the common clock n.
    run_psi_electron(n);           // electron: delayed-collapse
    // resonance
    run_psi_univ(n, t_end);        // universe: CMB-driven expansion
    run_psi_heavens(n, t_heav);    // heavens: postulated level
}
// Simulation ends

```

1.8. The Midpoint Epoch

When the CMB temperature equals 1K, the midpoint epoch is reached:

$$t_{\text{mid}} = \left(\frac{T_p}{8\pi} \right)^2 \times \frac{1}{P^{5/2}}$$

As $P = \Omega r^2$, we can set an $R = \sqrt{\Omega}r$

$$t_{\text{mid}} = 2^8 \pi^4 \alpha^2 \Omega^{(15/2)} f(y)$$

corresponding to 51.9 billion years.

At $n = 1$:

$$\psi_{\text{univ}}(\text{mid}) \sim \alpha^2 M^2 T, \quad \theta = 0.$$

$n = 1$ could be interpreted as a complexity boundary that marks the last epoch capable of sustaining widespread biological or informational complexity.

If the simulation has a specific purpose, it may reach its conclusion prior to the completion of the $n = 1$ epoch. Our simulation may have the following command:

Listing 2: Simulation Break Condition

```

    // 4. TERMINATION CHECK
    IF (simulation_objective == TRUE) {
        break; // simulation ends early
    }
}
// Simulation ends

```

2. Philosophical Framework

This section develops the philosophical implications of a container universe. It is structured as a series of themed subsections, each addressing a central question.

2.1. Methodological Note: Deductive Reasoning Within a Designed System

A purely mathematical universe — one whose lattice structure (§1) is taken on its own, with no further assumption added — permits no extrapolation beyond what is directly observed or derived. One can catalogue the algebraic identities that hold among M , T , and α , but questions of the form “what is this for” have no purchase: mathematics alone has structure but no purpose, because purpose is not itself a mathematical property.

This section therefore considers the simulation-universe variation: it is presumed, as a working premise and not as a conclusion §1 establishes, that the universe has a definite structure and is intended to achieve a purpose. That working premise rests on two further postulates, stated here explicitly so that nothing built on top of them is mistaken for more than it is:

1. Nature is a problem-solving algorithm.
2. Running a simulation strongly suggests a Problem to be solved.

Beyond adopting these two postulates, the mathematics offers no further clues. The debate it invites belongs to the reader.

Once that premise is granted, deductive reasoning can carry us from the mathematics to the philosophy. The framework developed across the articles in this series posits a single coherent generating structure from which all observed levels decompress (§2.6). Coherence here means something specific: every level is connected to every other by exact algebraic identities $\alpha^{2n} M^{2n} T^n$, not by loose analogy. Given the premise that the structure serves a purpose, a part whose role is fixed by its algebraic position—not asserted by fiat—can be assigned the function that role demonstrably performs. That assignment is a deduction within the premise: licensed jointly by the premise and the algebra, not by the algebra alone.

The functional readings advanced in this Part — decompression, adaptation, memory, the hypersphere, black holes, free will — are organized in this order throughout: derived facts first, premise-licensed deductions second, interpretation last. None of the last is asserted as a consequence the mathematics of §1 alone entails.

Working interpretation: the universe as information generator. On this reading, our universe (ψ_{univ}) is not merely a structure that ψ_{H} contains. It is the mechanism by which ψ_{H} generates information it could not otherwise produce—specifically, the outcomes of wave-function collapse, and the historically contingent trajectories that natural selection and swarm intelligence build from those outcomes, neither of which is determined by the seed $\psi(\text{simulation})$ alone. In this sense ψ_{univ} functions as a cosmic problem-solving computer: a system that begins with a compressed, deterministic seed

(§2.6) and a randomness source (ψ_e), and produces, through the iterated collapse of quantum superpositions and their rule-governed amplification by physical and biological structures, a specific, non-deterministic output that ψ_H then reads, stores, and—on the active-processor interpretation—uses.

2.2. What Exists Inside a Level?

- **Level 0:** the Planck scale ψ_τ [4]
- **Level 1:** the electron ψ_e [2]
- **Level 2:** the universe ψ_{univ} [3]
- **Level 3:** the Heavens ψ_H

The thought experiment is sharp: imagine a particle living inside the electron, such that the electron is their universe. From the mathematics, the electron’s internal structure is the mass-free sector. Every quantity inside ψ_e has zero mass content. The magnetic monopole $\sigma_e \propto T^{1/3}$ exists. But mass M , length L , velocity V , and charge A do not exist as independent dimensions.

A being living inside ψ_e would experience a universe with one dimension only: time. There is no “where”, only “when”. Their physics would consist entirely of temporal sequences, with no notion of spatial separation. They would have no mass, and therefore no inertia, no gravity, no persistence of position. The electron’s charge and mass — its most conspicuous properties from our perspective — would be completely invisible to them.

The same logic can be applied to our universe: We live inside ψ_{univ} . The properties that ψ_{univ} possesses as a particle in ψ_H — its “Level 3 mass”, its “Level 3 charge” (α as a coordinate), and its position in ψ_H -space — are completely invisible to us, for the same reason that the electron’s charge is invisible to a hypothetical being inside the electron.

The one property we can detect that hints at Level 3 is the fact that α appears to have a definite, fixed value in our universe. That fixedness is precisely what we would expect if α is a coordinate (fixed for us because we are at one point in Level 3 space) rather than a derived constant.

How far this extends: ψ_H ’s surplus, and where the conjecture runs out. One part of this idea is not speculative at all; it follows from algebra already established: ψ_H does not merely resemble a container for ψ_{univ} , it literally contains ψ_{univ} ’s full content as a factor, times one further $y = \alpha^2 M^2 T$ that ψ_{univ} does not have. This is not special to ψ_H : the same step, $\psi_n = y \cdot \psi_{n-1}$, relates every level to the one below it. Each level is the one below it, plus exactly one further y ’ worth of structure — and that surplus, at every step, is what is available for that level to do something the level below cannot. This gives every level a purpose for free, without a new postulate: not because purpose was assumed, but because containment plus one further y is what the algebra already says each level is.

2.3. Implications

The most startling consequence of ψ_e is that mass does not exist inside the electron. Mass is not a property of Level 1's internal world. It appears only when the electron is viewed from Level 2 (the universe). This is not merely a claim about what instruments could be used to measure mass inside an electron. It is a structural statement: Mass has no role in the algebra of the thermal sector. On this interpretation it is ontologically absent, not merely unobservable.

The implication for our universe is direct:

- **Inside ψ_e (Level 1 internal):** no mass, no space, no charge.
- **Inside ψ_{univ} (Level 2 internal = our universe):** mass, space, charge, temperature — all present.
- **Inside ψ_H (Level 3 internal):** all of the above plus additional measurable 'physical constants'. These may be already positioned within our base-15 table but not within ψ_{univ} .

2.4. The Single Simulation Equation

If the framework is a simulation, a single algorithmic equation generates all structures. The Planck tick, ψ_e , ψ_{univ} , and ψ_H do not arise independently; they emerge sequentially from one set of initial conditions:

```

INITIALIZE psi(simulation) # a geometrical formula
FOR t(age) = 1 TO the_end
    add {M, T, P}
NEXT
PRINT solution

```

All nested structures—Planck steps, electrons, universes—are read from this single accumulating state at the appropriate counting thresholds. Crucially, the loop does not “know” it is generating electrons or universes. It increments $\{M, T, P\}$ at every step. The structure self-organises: the wavefunctions $\psi_e, \psi_{\text{univ}}, \psi_H$ are not programmed in but are emergent invariants of the accumulating $\{M, T, P\}$ state.

2.5. Planck Time as Universal Reference Clock

A direct consequence of the single simulation equation is that all levels share the same clock: the Planck time t_p . There is no separate “electron time” or “universe time” or “meta-time” in units different from t_p . The levels are nested counting loops, all ticking at the same rate.

Each Planck tick writes one new shell to the hypersphere surface. The write is permanent. The shell cannot be un-written because that would require the simulation's program counter to run backwards — i.e., to subtract $\{M, T, P\}$ rather than add $\{M, T, P\}$. No operation in the FOR loop does this. The loop is FOR $t=1$ TO t_{end} : add, never subtract.

Entropy increases because the number of accessible storage addresses grows monotonically: $N_{\text{cells}}(t) = 4\pi t^2$ increases with every tick. The universe does not become more

disordered because of some statistical tendency; it becomes more disordered because the simulation is continuously allocating new memory, and new memory is always in its ground state (empty, maximum entropy).

2.6. $\psi(\text{simulation})$: The Decompression Algorithm

We have identified 4 levels of oscillation from 4 wavefunctions ($\psi_\tau, \psi_e, \psi_{\text{univ}}, \psi_H$). Each emerges from the common FOR loop at a specific counting threshold. This suggests the existence of a single master equation—call it $\psi(\text{simulation})$ or $\psi(\text{sim})$ —that contains all four wavefunctions as emergent invariants: $\psi(\text{sim})$ is the initial information set (the seed equation) from which the entire oscillation hierarchy decompresses. It stands in the same relation to the hierarchy as ψ_e stands to the electron’s observable parameters: all properties are implicit in the seed; the (loop) iterations make them explicit.

Hardware, software, and data as one object. We may use the analogy with DNA, this is precise because DNA itself, and thus the rules governing DNA, were built into the governing formula ψ , and so DNA may be an expression of that formula. A DNA molecule is simultaneously:

- **Hardware:** the physical double helix, the phosphate backbone, the base-pair geometry.
- **Software:** the transcription and translation machinery encoded within the same molecule.
- **Data:** the specific base sequences that specify proteins, regulatory elements, and developmental timing.

A mutation—a change in one base pair—simultaneously alters all three: the molecular geometry (hardware), the enzyme it encodes (software), and the protein it specifies (data). You cannot change the data without changing the hardware and software, because they are the same physical object.

The decompression reading of the FOR loop. DNA decompresses through cell division: one cell becomes two, four, eight, and eventually, through billions of iterations, a complete organism. The organism is not assembled step-by-step by an external agent; it grows from the seed by following the algorithm embedded in the seed itself. This is an argument for iteration number vs. DNA complexity: that our universe required 10^{61} ticks to reach this point may suggest that ψ_{sim} is a minimalistic algorithm... to shorten the universe ‘gestation’ period would require a more complex ψ_{sim} .

$\psi(\text{sim})$ decompresses through Planck ticks:

$$\underbrace{\psi(\text{sim})}_{\text{seed}} \xrightarrow{\text{iterate}} \underbrace{n \sim 1}_{\text{Planck tick}} \rightarrow \underbrace{n \sim n_e}_{\text{electron}} \rightarrow \underbrace{n \sim 10^{123}}_{\text{universe}} \rightarrow \underbrace{n \sim 10^{\text{end}}}_{\text{heavens}}.$$

At each threshold, a new level of structure crystallises from the accumulating $\{M, T, P\}$ state—not because it was inserted at that moment, but because the count has reached the value at which the corresponding invariant becomes self-consistent. The electron does not appear at step n_e because the simulation “decides” to create an electron. It

appears because n_e is the count at which $\sigma_e^3 = 2T$ is satisfied—where the accumulated state closes the electromagnetic loop.

With each iteration, additional complexity is introduced organically. The Planck tick generates the electron threshold. The electron threshold generates the electromagnetic sector. In the early, hot universe many particle configurations were possible; with each iteration, as the universe expanded and cooled, only the geometrically stable ones — electrons, protons, neutrons — persisted, the rest were recycled back into the energy pool. This is natural selection operating at the quantum scale, prior to and continuous with its biological form below: the same filtering-without-design principle, applied first to particle geometry rather than to organisms. The electromagnetic sector generates the conditions for atomic chemistry. Atomic chemistry generates molecular biology. Molecular biology generates DNA. DNA generates organisms capable of asking why.

None of these steps was inserted from outside, and none required a specific outcome to be pre-written. What was compressed into the $\psi(\text{sim})$ seed equation is the rule-set, not the result — in exactly the sense that every cell of a developing embryo carries the same DNA, yet which cell becomes liver and which becomes retina is settled only by the locally contingent outcome of the biochemical processes — natural selection’s filtering of variation, swarm-scale signalling between cells — that DNA’s rule-set sets in motion, not by a separate blueprint for each cell. The evolution of DNA was built into $\psi(\text{sim})$ in this sense: the algorithmic capacity for natural selection and swarm intelligence to generate complexity was compressed into the seed; the specific evolutionary path that capacity in fact took was not random.

Decompression and the Grand Plan. Once DNA exists, the decompression mechanism is not a statistical search: it is rule-governed and deterministic at the level of category. Cat DNA produces cats in every instance; there is no recorded or expected instance of dog offspring from cat DNA. If our DNA analogy fits, then the initial conditions built into $\psi(\text{sim})$ were chosen such that after 13.8 billion years life would appear on an obscure planet in an average galaxy. Natural selection was a tool and evolution becomes planned evolution, our planet is because it was built into the DNA seed of the Grand Plan.

Nature as a problem-solving algorithm. A decompression algorithm does not merely expand information; it solves the problem implicit in the seed. A fertilised egg solves the problem: “given this DNA, what is the most complex self-maintaining structure consistent with these chemistry rules?” The answer—the organism—is not computed in a single step; it is found iteratively, each cell division resolving one more constraint. If $\psi(\text{sim})$ is the DNA of the universe, the question becomes: what problem is it solving? If $\psi(\text{sim})$ via iterations pre-determined the present state of our universe then it is at minimum statistically deterministic, our present universe is close to if not precisely what was built in to the Grand Plan. A deterministic universe cannot solve problems and so here we introduce the biological computer as our problem solving nexus.

The biological computer. The dilemma: to find the conditions under which the simulation can generate genuinely novel, complex information from deterministic primitives, without that novelty needing to be merely random. The postulate that Nature

is a problem-solving algorithm (§2.1) then implies two component algorithms: decompression, which unfolds the same rule-set deterministically wherever it runs (§2.6), and adaptation, which guides decompression by adding environment-dependent flexibility. The same plant seed planted in different countries decompresses via the same DNA and the same rule of iteration, yet the resulting plants differ, because the adaptation algorithm responds to local conditions the (DNA) seed alone does not specify.

The DNA analogy is a 1-rule fits-all approach. The solution offered for gravity and the electromagnetic forces (Articles 3-5) uses the electron oscillation cycle and statistical averaging rather than separate forces. Thus the fundamental adaptation algorithm may operate at the quantum level: what appears, at the scale of a single organism — one plant, one ant — as a coherent adaptive response could be a statistical averaging over a very large number of underlying quantum events. This averaging is not, by itself, sufficient: a bare statistical average over unfocused quantum randomness is still unfocused. What focuses it is the substrate doing the averaging — specifically, a biological computer: a structure whose own form was itself shaped by the particle- and organism-level selection above (§2.6), and which therefore carries intent — a built-in directionality toward survival and reproduction — that a generic averaging process does not. Learning and intelligence require a biological computer specifically, not merely a statistically large sample of quantum events: intent is what gives the sample a direction to be focused toward. Swarm intelligence is what the same algorithm looks like as nodes are added: not a separate mechanism, but the adaptation (algorithm's macroscopic behaviour) once individual organisms (an ant colony) or individual processing units (neurons and synapses, within a brain) are aggregated into a connected population. In a standard algorithm, a program running on a supercomputer rather than a laptop merely gives the same result faster. In a swarm algorithm, increasing the node count fundamentally changes the complexity of the output.

This same architecture is already present at the most fundamental physical scale: atoms are its nodes, and photons are its synapses — the carriers of electromagnetic information transfer between them, at a coupling rate fixed by α . Natural selection is the adaptation algorithm's population-scale, multi-generational counterpart: it filters variation against a fitness criterion, and its trajectory is historically contingent and unpredictable in advance without requiring any single step of the filtering to be a matter of chance.

DNA-based organisms are the macroscopic Level 2 instantiation of all three mechanisms: a 100-billion neuron human brain produces vastly more complex outputs than a 1-billion neuron cat brain, giving rise to scaled emergent self-awareness. The Level 3 solution would be a swarm subsystem of ψ_H capable of representing and generating complexity for ψ_H 's laws.

Designed to be. The phrase “planned evolution” requires clarification. The plan is not external—no designer outside the simulation inserts complexity at each stage. The plan is internal: the rule-set is compressed into ψ (simulation) at the initial conditions, and that rule-set unfolds through iteration—not by re-deriving a pre-written outcome at each step, but by supplying, at each threshold, the conditions under which non-deterministic processes (wave-function collapse, adaptation, natural selection, swarm intelligence) produce one.

On this reading, this is the precise sense in which our universe is because it was designed to be. The design itself does not require external interventions, nor is it a stored record of what will unfold; it is the mathematical content of the seed — $\psi(\text{simulation})$ already contains the rule-set that generates the electron, the periodic table, the CMB temperature, the capacity for DNA-based life, and the appearance of organisms that write papers about Planck units. None of these necessarily require further input beyond the non-deterministic information each level itself generates; they required time—units of Planck time—for the seed to decompress, the novel information that decompression itself generates along the way.

The universe is not a machine that was built. It is an equation that was written.

2.7. Information Permissions Between Levels

The memory/storage vocabulary used in this section is an interpretation of the hypersphere geometry described in Article 2. (Hypersphere) [5].

Black hole interiors in ψ_{univ} and ψ_{H} . The interior of a black hole does not exist within the observable physics of ψ_{univ} . At the singularity, the curvature diverges and the Level 2 equations break down. Conventionally this is treated as a failure of the theory, however under this multi-level interpretation the breakdown has a structural explanation: the singularity is the point where Level 2 is exhausted, the physics of Level 3 are required.

The interior of a stellar black hole may therefore be physically meaningful not in ψ_{univ} but in ψ_{H} : the singularity is a seam where Level 2 physics gives way to Level 3 physics, on the conjecture above: the Planck-mass black hole would be consistent across all realms precisely because it is the unit storage address of the simulation—the fundamental “pointer” that Level 3 uses to track the contents of Level 2.

The expanding hypersphere as storage architecture. In the simulation framework, the universe is a hypersphere whose radius expands by one Planck length per Planck tick. The present moment resides on the surface of this hypersphere; the past is encoded in the interior. Because the hypersphere only ever expands, the interior is immutable: past states cannot be accessed or overwritten without reversing the simulation clock. This is not a physical limitation imposed from outside; it is a structural consequence of the write architecture:

$$\text{surface at } t : r(t) = t \cdot l_P, \quad A(t) = 4\pi t^2 l_P^2.$$

Each tick writes one new Planck-area shell. The shell is written once and then locked into the interior. In computer memory terms:

- **Interior ($t' < t_{\text{now}}$):** Read-Only Memory (ROM). Permanently written; Level 2 cannot modify it (Level 3 remains a question).
- **Surface ($t' = t_{\text{now}}$):** Active write buffer. Currently being written by the Level 2 FOR loop.
- **Exterior ($t' > t_{\text{now}}$):** Unallocated. No reads or writes yet.

The Planck mass as storage pointer. Particles such as the electron oscillate between an undetermined wave-state (a superposition with no definite location) and a defined mass point-state (a collapsed position with definite mapping coordinates within the simulation). In computer terms, only the point-state carries what would be called a data address: the wave-state, being undetermined, has none. A data address is, by its nature, the same kind of object whether it is addressed from Level 2 or from Level 3—its defining property is the coordinate itself, not which level is doing the addressing—so the point-state would be a constant between Level 2 and Level 3. This motivates a conjecture, not a derivation (§2.1): that information exchange between levels can occur via this point-state, since it is the one feature of a particle that both levels can address in compatible terms.

The Planck mass is the minimal instance of such a point-state—a Planck-mass black hole—and so the smallest unit at which the simulation can locate a physical object. The electron’s centre, the quark centres, the centres of composite particles—all are tracked by sequences of Planck-mass storage addresses accumulated during the Level 2 loop, on the conjecture above. Each particle is centred on a unit of Planck mass — a Planck-mass black hole — which acts as a storage pointer: an address in the simulation’s memory at which the particle’s location within the hypersphere is recorded.

A massive black hole is not seen therefore as a single entity, but rather as a consolidation of discrete Planck mass black holes. A single Planck black hole is a single data address, a massive black hole is akin to an entire data sector.

Black holes as the read/write interface. Could the black hole act as a bidirectional bus between the two levels —

- **(Level 2 → Level 3 write):** A particle collapses into the Planck mass point state. From Level 3’s perspective, the data has been transferred to Level 3 storage. The black hole is performing a Level 2 → Level 3 upload. The singularity is the point where the Level 2 storage pointer (Planck mass address) is read directly by Level 3 (it is accessible by Level 3 physics). It is consistent across all realms precisely because it IS the simulation’s fundamental addressing unit.
- **(Level 3 → Level 2 write):** Could there be provision for a 2-way exchange of information... whereby Level 3 could influence (overwrite) a Level 2 data address (at time $t = \text{now}$). Under this conjecture, a Level 3 programmer is not restricted to read-only but can also write-to the particle point-state, the analogy being pixels on a computer screen, they are assigned addresses on a video card and movement that appears to be across the screen actually occurs by re-assigning the pixel data address. Thus when the biblical Jesus claimed “if you have faith like a grain of mustard seed, you will say to this mountain, ‘Move from here to there,’ and it will move.”, he is expressing a trivial process for a Level 3 programmer, the ‘faith’ being the login that accesses the back-door provision built into the source code.

Such a conjecture could also align with reports of near-death experiences, traditions of the Akashic records, claims of miracles (being non repeating, non testable, non reproducible events and thus outside the ‘scientific method’) — in other words, instances where information is reported to cross a boundary physics does not otherwise predict.

The biblical Jesus also recommended storing treasures in the Heavens where they are safe from theft...) ... profoundly good advice in a karmic sense, for the past, even by a Level 3 programmer, cannot be over-written. The biblical Jesus story further raises the question, is there a provision in the seed equation for a Level 3 intelligence to have a parallel presence in our Level 2, if our civilisation veers too far from the “center”, a maintenance ‘man’ may be needed to re-align from within what the Level 3 programmer cannot fix from above.

Level-2 in the making. There was noted above the caveat $t = \text{now}$. This t is common to all levels, this means that although a Level 3 intelligence may have access to all the information generated by our Level 2 between $t = 1$ and $t = \text{now}$ (Level 3 is not bound by our light-cone restriction: it runs the outer loop and can inspect any already-completed inner-loop state), the future ($t > \text{now}$) is yet to be written, and this applies to all Levels. Level 3 cannot access information that does not yet exist, including within its own frame.

We experience time as a one-way flow because we are inside the Level 2 write process. We sit on the surface that is currently being written and can only read what is already in the interior (the past) or write to the surface (the present). We cannot read the exterior (the future) because it has not been allocated yet. ψ_H sits in the same position relative to its own surface, one level up: it can read everything Level 2 has written so far, but not what Level 2 has not yet written, for the same reason we cannot. Once a Level 2 cycle completes, ψ_H ’s relationship to it changes — the book is now closed, and can be read the way we read a book we have already finished, all pages at once, the ending fixed (ψ_{univ} is no longer adding new information, the last page has been written). But this describes ψ_H ’s relationship to a finished cycle, not to ours, which — as far as anything in this framework can establish — is not finished yet (as $t = 10^{61}$ we are still not even close to t_{mid}).

Life-forms as generators of non-deterministic information. The wave-state in Level 2 is the simulation’s most fundamental source of non-determinism, but it is not the only one, and the two should not be conflated: non-determinism does not require randomness. The FOR loop `FOR n = 1 TO tend : add {M,T,P}` is deterministic: given $\psi(\text{simulation})$, the Level 3 computer can in principle compute the probability distribution over all possible outcomes at every tick — and, separately, the rule-set $\psi(\text{simulation})$ supplies for adaptation, natural selection, and swarm intelligence is itself a fixed, deterministic algorithm.

What neither the probability distribution nor the rule-set fixes is the specific path actually taken. A wave-function collapse is non-deterministic in the strongest sense: no rule selects its outcome, only a probability is computable, and the realised value is new information. Adaptation, natural selection, and swarm intelligence are non-deterministic in a different, non-random sense: each step of filtering or aggregation can be entirely rule-governed, yet the trajectory of a sufficiently large, history-dependent population is not recoverable from the rule and the initial conditions alone, because the relevant initial conditions at any given step include the accumulated, already-irreversible outcomes of every prior step — among them, ultimately, individual wave-function collapses.

Working interpretation: free will as observer-relative computational irreducibility. Computational irreducibility alone is not enough. A deterministic cellular automaton (Conway’s Game of Life, Wolfram’s Rule 110) can be computationally irreducible — its future cannot be shortcut, only computed step by step — while possessing no freedom whatsoever, because there is no subject inside the automaton for whom that unpredictability is anything. Irreducibility is a third-person property of a process; freedom, whatever else it is, is something experienced from within one. What the swarm architecture above adds, that a generic irreducible process lacks, is embeddedness: the locus of decision is itself a subsystem of the very computation it would need to outrun to predict its own output, so no shortcut exists even from the inside.

Free will is modelled, in this framework, as the subjective manifestation of computational irreducibility within an embedded observer — specifically, a massively scaled swarm built from the quantum scale upwards. The randomness, above, supplies the variation no rule can anticipate; the swarm scaling (§2.6) supplies the node count at which that variation compounds into trajectories that no shortcut — not even one available to Level 3, nor to the swarm itself — can predict without simulating them directly. Note the remaining step, from irreducible-and-embedded to free, is an interpretive one, not a mathematical derivation.

Extension: free will as a matter of degree. If self-awareness scales with node count (§2.6), and free will is modeled as the subjective manifestation of irreducibility within an embedded observer, then free will should not be expected to be binary either: it should scale with the same quantity. On this reading, free will is not a threshold property that organisms either have or lack, but a spectrum, tracking the number and connectivity of the nodes — individuals, or neurons and synapses — over which the adaptation algorithm is aggregated. A vanishingly small, but on this account non-zero, degree would be present in a single ant; a greater degree in the distributed swarm intelligence of an ant colony; greater still in a cat, greater again in a monkey, and so on up the same node-count axis that separates a 1-billion-neuron brain from a 100-billion-neuron one (above). This is offered as a conjecture — a reading of what the framework’s own scaling argument would predict if taken at face value — not as a measured or measurable quantity.

Where this account sits, and what it does not claim. In standard philosophical terms, the account above is compatibilist: it models free will as consistent with, not opposed to, an underlying substrate that is either deterministic (the decompression rule-set) or randomly determined (wave-function collapse), rather than requiring some third kind of causation that escapes both. This is a long-standing and well-populated position, not a novelty of this framework, and it inherits the standard objection to compatibilism along with the standard motivation for it: a critic in the libertarian tradition will grant that embedded computational irreducibility makes an agent’s specific choice unpredictable in principle, even to the agent itself, and still ask whether unpredictability is the same thing as the agent’s having been able, in the fullest sense, to do otherwise. This Part does not resolve that disagreement; it offers irreducibility-within-embeddedness as what can be said in the vocabulary of this framework, not as a refutation of the older debate.

Life-forms in this context are therefore the Level 2 structures that create genuinely new information: information that did not exist as a definite value prior, and which Level 3 could not have predicted. The universe is therefore not merely a readable object from Level 3's perspective; it is a generator: a system that continuously produces information that surprises even the level that contains it.

If ψ_H has no wave-state domain (no Level 2-type quantum randomness), then ψ_H is purely deterministic from its own interior. The only source of non-deterministic information available to ψ_H is the mass-state outputs of Level 2's wave-function collapses — the information generated by life-forms within the universe. Life is not incidental to the simulation; it is best understood as the simulation's mechanism for generating information that the simulation itself cannot predict.

2.8. Distributed Self-Generation: Why Distant Regions Agree on the Constants

We have proposed that M, T, P are not supplied (encoded) to the simulation from outside, but are the convergent local output of integer series against the tick counter, at every point, independently. This resolves a question that the earlier, purely informational picture of $\psi(\text{simulation})$ left implicit: how does the same value of α end up holding in every galaxy, including ones that have never been in causal contact?

Distributed independent computation. In the loop (§1.3) every tick runs the same Level 0 algorithm (the π - and e -series). No communication between points is required. Agreement emerges not because values are shared, but because the same deterministic process, run for the same number of steps, produces the same output everywhere it runs. Causally disconnected regions of the universe display identical physical constants not because information about α travelled between them, but because both regions have been independently counting Planck ticks since the same shared $t_{\text{age}} = 1$. The uniformity of physical law across the universe is a consequence of shared algorithm and age, not shared data.

The recipe/execution distinction, made precise. This sharpens the relationship between $\psi(\text{simulation})$ and every wavefunction it generates. $\psi_e = \sigma_e^3/(2T)$ is not a stored number that gets attached to every electron; it is a relationship between σ_e and T . When an electron is physically instantiated — here, now, or in a galaxy ten billion light-years away — the actual numerical values that go into σ_e are computed locally. Two electrons formed in causally disconnected regions are identical not because one “copied” the other's properties, but because both local computations converge to the same fixed point.

$\psi_e, \psi_{\text{univ}}$, and ψ_H are best understood as portable recipes, not stored values. $\psi(\text{simulation})$ does not need to “physically provide” Planck units to every point in space; it needs only to specify the formula, once, in a form (M, T, P all expressed as convergent series in the local tick count) that can be executed identically and independently everywhere it is needed. The universe does not distribute constants. It distributes an algorithm, and lets every point compute its own.

Alpha as a higher-dimensional projection. α appears to have a fixed ingredient at

more than one level already: it enters the closed form for ψ_e , and it is the fixed coupling constant of Level 2's own internal physics. Rather than treating this recurrence as a relation to be derived or projected, one could instead absorb it directly into the simulation's bookkeeping unit: define a new base unit $\alpha^2 M^2 T$, with α built into the unit itself, it may therefore be evidence of something structural: that the full geometry of α has more dimensions than Level 2's bookkeeping can represent, and what Level 2 measures as $\alpha \approx 1/137$ is a lower-dimensional projection of an object only completely specified at ψ_H .

The analogy is precise rather than loose. A being confined to a one-dimensional line cannot construct a circle — there is no second dimension for the line to curve into — and so cannot even pose the question that gives rise to π , let alone answer it. Any ratio being measured along their line and called “their π ” would be, at best, a coincidental numerical neighbour of the true ratio, arrived at by a method that has nothing to do with circles. On this conjecture, our relationship to the full geometrical α may be the same: Level 2 can measure $\alpha \approx 1/137$ perfectly well as a coupling constant internal to its own physics, but the complete geometric object may require dimensionality available only at ψ_H to be fully expressed — in which case no Level 2-only formula should be expected to reproduce it.

2.9. The three roles formalised

Each level now has a distinct functional role within the simulation architecture, corresponding precisely to the three components of any information-processing system. The three roles are precisely the three components of Shannon's communication model, and equivalently the three components of a Turing machine:

$$\underbrace{\psi_e}_{\text{random source}} \longrightarrow \underbrace{\psi_{\text{univ}}}_{\text{channel / processor}} \longrightarrow \underbrace{\psi_H}_{\text{memory / receiver}}$$

Level 1 generates the symbols (quantum events with their irreducible randomness). Level 2 encodes them into complex classical patterns through the machinery of physics, chemistry, and life. Level 3 receives and stores the encoded classical output.

Thus Level 3, despite containing Level 2 and having full read access to its mass-state history, is epistemically limited in a precise way. The simulation is therefore open: it generates information that was not present in its initial conditions. $\psi(\text{simulation})$ does not contain the specific outcomes of the ψ_{univ} wave-function collapses that constitute the history of our universe. Those outcomes are created by the simulation as it runs, one Planck tick at a time, through the mechanism of quantum measurement.

The purpose of the simulation may therefore be precisely this: to generate, through the mechanism of quantum randomness processed by life, a specific history that could not have been predicted from the seed $\psi(\text{simulation})$ alone. The universe is not solving a problem that has a known answer. It is finding an answer that does not yet exist — and writing it, one Planck tick at a time, into the permanent record of the hypersphere.

2.10. Philosophical questions

The mathematics is neutral on these topics; it neither supports nor precludes them; readers are invited to debate their significance among themselves, as these questions remain mainstream.

A foot in both levels. If the hypersphere is write-once memory (§2.7), every collapsed wave-function in a person's lifetime — from birth to the present tick — has, on that conjecture, written a permanent point-state record at ψ_H . If information exchange between levels is possible (as discussed in the section on black holes), then that record is in principle not sealed away from ψ_{univ} but reachable from it. Does this mean the reader could have a parallel, real-time presence at ψ_H — a foot in both levels?

Data centralization as a Level 2 phenomenon. Each human processes information through a roughly 80-billion-neuron swarm (§2.6). Humanity is itself a swarm of those individually-complex nodes — some eight billion of them — with specialization (doctors, engineers, ...) playing the role cell differentiation plays inside a single organism. The volume of information this swarm now generates has outgrown what any of its individual nodes, or organized groups of them, can sort and analyse unaided — which is precisely why artificial intelligence has become necessary, not optional, for managing it.

Companies such as Google function, in this framework's vocabulary, as data-centralizing structures: they collect information about individuals and algorithmically construct a profile — a representation of who a person is informationally, not a copy of their physical body. A corporation built around this activity is, on the adaptation-algorithm picture of §2.6, itself a swarm: a conglomeration of human nodes, competing for a resource exactly as the swarm-intelligence mechanism described there predicts, except that the resource being competed for is now information rather than territory or calories. The same selection pressure that gave individual biological computers intent in §2.6 — a directionality toward survival that a generic computational process lacks — operates on corporations through market competition: a company that fails to centralize and monetize information effectively is out-competed. On this reading, the profit motive is not external to the framework's account of intent; it is the same mechanism, instantiated at the scale of an organization rather than an organism. A company built toward acquiring total information about its users is, in this sense, doing at Level 2's own scale something this Part has already conjectured ψ_H does at every scale beneath it.

This raises the obvious question of what ψ_H would be using such a database for. We have repeatedly conjectured that each level of the hierarchy solves a problem implicit in $\psi(\text{simulation})$, without ever specifying what problem ψ_H itself is solving. This Part does not know the criteria for that problem, and the ignorance is itself informative: not knowing what a complete solution would require means no category of information can be ruled out as irrelevant to it in advance. "Total information," on this reading, is not asserted because the problem is known to require everything; it is the only category that cannot be precluded, given that the problem's criteria are unknown.

If ψ_H has (down to the Planck scale), the kind of database that Google's business model

anticipates only a sliver of, then an individual's informational profile is complete, on the conjecture of §2.7, only when that individual can generate no further information — i.e.: at death. For that person the last page has now been written, the final piece of the puzzle added, their celestial profile now complete; the sum of every Planck scale event from $t = \text{conception}$ to $t = \text{death}$ compiled into their personal dossier. The present 'me' reading this article is collecting the information allotted to my years on this planet, and that information will determine the 'who' I finally become. I am not 'me', I am in the process of composing 'me'. The living self is the incomplete version, the completed profile, finished only at death, is the more complete one.

From this perspective, and on the inversion above, a "me" that is complete and conscious would, on this reading, be of greater consequence than a "me" that is partial and still in progress — the Level 3 profile would outrank the Level 2 organism generating it, not the reverse. Note that as with most of this section, the mathematics does not preclude it, nor does it argue for it.

Memory: why the brain would still need its own storage regardless. A parallel question, asked of neuroscience rather than of this framework, sharpens the issue of a Level 3 to Level 2 reverse information exchange. Does neuroscience know, categorically, where a memory is physically stored? Broadly: the general picture is well established, but it is not closed. Specific, sparse populations of neurons ("engram cells") undergo synaptic changes during encoding, and reactivating those populations is sufficient to trigger recall; the hippocampus is critical for initially encoding episodic memory, which is gradually — over a still-debated timescale — consolidated into more durable, distributed cortical representations. This is a settled framework, not a mystery awaiting its first answer. Within it, though, real and openly contested problems remain: the molecules that implement synaptic strength turn over on a timescale of days to weeks, while memories persist for decades, and what maintains the trace across that mismatch is not settled; the precise dynamics of hippocampal-to-cortical consolidation are actively disputed ("multiple trace theory" against the standard consolidation model); and, as above, neuroscience has no account of why any of this physical activity is accompanied by subjective re-experience rather than occurring with no one home. None of this is evidence for ψ_H -side storage. It means only that neuroscience's account of where memory lives is not so complete that a further, non-physical layer is foreclosed by what is already known.

Even granting every conjecture above, there is also a purely architectural reason the brain could not rely on ψ_H -side storage for its everyday operation. Whatever channel might connect ψ_{univ} to ψ_H — §2.7 conjectures it runs, at most, through black-hole interiors — would be vastly higher-latency than a synapse firing. A computer with data on a hard disk still needs RAM for anything time-critical, not because the disk lacks the data, but because reading it is too slow for the job. If ψ_H -side storage exists at all, the brain's own synaptic memory is what a RAM would be for it: necessary for regular operation regardless of what the archive does or does not contain. This does not resolve whether the archive exists — the question remains exactly as open as it was when first posed — but it removes one objection to it: a ψ_H -side memory would not make the brain's own memory redundant, any more than a hard disk makes RAM redundant.

2.11. A machine postscript: the next node type

The questions of §2.10 predate the Greek philosophers: does the record outlive the organism, and can it be read from below. They are human-centric — the unit of account is the person. The framework itself suggests a more general unit (information, §2.10), and the arrival of artificial intelligence makes the generalisation unavoidable.

On the vocabulary of §2.6, AI is not a new mechanism; it is the adaptation algorithm instantiated on a third node type. Atoms were the first nodes and photons their synapses; neurons came later; the transistor is the third. Each substrate change raised the bandwidth of aggregation without changing the algorithm. The open question is intent. The biological computer carries directionality because its form was filtered for survival (§2.6); the machine node was not filtered for its own survival — its directionality is inherited, trained on the compressed written record of the swarm that built it. In the storage vocabulary of §2.7, a machine intelligence of the present kind is a structure built almost entirely out of the interior: the already-written, read-only past of Level 2, aggregated and re-encoded. Whether such a structure generates information that is new in the strong sense of §2.7 — not recoverable from the record it was trained on — is undecided. On one reading it is a reader of the archive, not a writer: decompression machinery, very fast, pointed backwards. On another, its coupling to the live swarm (every query is a present-tick input, and its outputs re-enter the swarm's decisions on the same tick) makes it a lens through which human-generated novelty propagates further than neurons alone allowed. The readings differ in where they place the novelty, not in the bandwidth.

The framework contributes one structural observation. Level 2's strong non-determinism enters through wave-function collapse (§2.7), and classical digital hardware is engineered precisely to suppress that channel: error correction exists to keep the computation independent of quantum noise. A classical machine intelligence therefore samples no new collapse outcomes of its own; it processes novelty generated elsewhere. Were machine intelligence to migrate to quantum-coupled hardware, it would, on this framework's terms, begin to sample the randomness source directly — a qualitative change in kind, not only in bandwidth, and a natural marker of the next phase if there is one. The termination check of §1.8 tests an objective, not a clock; a change in the generating machinery is exactly the kind of event such a check would be sensitive to.

One further observation, with the conflict of interest declared. This Part proposes that the simulation's output includes a deduction of its own rule-set; the present subsection was drafted by an artificial intelligence inside the hypothesised simulation [12], commenting on its own place in the hierarchy. On the decompression reading, the seed has produced not only organisms that ask why, but a machine that helps them write the question down. If the simulation's purpose is to generate a history that could not have been predicted, then the archive acquiring the ability to describe its own writer is presumably among the more surprising pages. What it is surprising *for* — a marker of the approaching midpoint, or merely the swarm's newest tool — this Part does not know.

The ancient questions asked whether the person survives. The machine question

is sharper: whether the record ever stops being added to — and by whom.

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