Could intelligence create real universes, and what would count as evidence?

The Hyperspace Recursive Intelligence Hypothesis

A Bayesian and Physical Research Programme for Intelligent Cosmogenesis

Method and tests, no data: a model space, observer weighting, a branching threshold and maker-selection

Its place in the corpus. The scientific core of HRIH, whose long-form edition is the formal statement of Recursive Creation, a speculative hypothesis reachable from Recursive Dynamics but never contained by it: none of Laws I to V is a premise of it or enters any likelihood in it, the ARC Theory loses nothing if it is refused, ARC work may inform its creator-stability factor, and neither the Eden Protocol nor the HARI Treaty enters it. Its other neighbours are the statement paper and the founding paper of Recursive Dynamics.

Working paper · A working draft under open review (page 2) ·
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The ARC Theory registration · Operational definitions · This paper's DOI

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The hypothesis is named in the author's self-emailed manuscript record of 8 December 2024 (dated provenance, not a publication), whose manuscripts have been public on OSF since 5 October 2026 [47]. The long-form edition was first published on 3 July 2026.

Why. I believe advanced AI is an existential risk unless values and correction are built into how it reasons; only proof will move the world.

Tests. How to test whether physical laws favour minds able to make universes.

Fields. Cosmology, Bayesian model comparison, philosophy of probability, branching processes, thermodynamics.

Author. Michael Darius Eastwood, BA (Hons), founder of Recursive Dynamics, without an institution or a doctorate: who he is; Paper C, how his mind works.

Abstract

To the question of why a universe has the laws, constants and boundary data it has, the Hyperspace Recursive Intelligence Hypothesis (HRIH) answers with intelligent cosmogenesis. This paper reconstructs it as a nested, falsifiable research programme, not as a claim that intelligence has been shown to create universes. It distinguishes (i) physically real intelligent cosmogenesis, in which an advanced agent instantiates a daughter cosmology; (ii) recursive cosmogenic lineages, in which such events occur over more than one generation; and (iii) a stronger closed-cycle submodel, postulated rather than derived from recursion, in which the whole history is a globally self-consistent fixed point or periodic orbit, so that the Big Bang need not be an unexplained first event. The paper specifies a fair model space containing non-deliberate cosmology, simulation families and real intelligent cosmogenesis, and derives that naive observer counting returns the analyst's prior rather than a fact about the world; it requires explicit observer weighting, defines a cosmogenic reproduction number and states the extinction threshold for a branching lineage. Its principal discriminator, a hypothesis for held-out tests to decide, is maker-selection beyond habitability: weighting laws and constants by independently defined cosmogenic capability, stable technological ascent and viable daughter yield. The one observation already in hand, the order of the initial condition, is used only in conditional form, and five predictions and five studies are specified for registration, each with what

would count against it. The reconstruction withdraws seven invalid inferences: recursion does not abolish boundary conditions; occurrence does not imply constructibility; ability does not imply preference for real cosmogenesis; broad recursive analogy is not support; unregistered probability ranges are not posteriors; lower-level ARC experiments do not test the cosmological ontology; and the closed loop is a nested stronger submodel rather than the premise of all intelligent cosmogenesis. Current evidence is non-discriminating between HRIH and its strongest rivals, and this paper assigns HRIH no posterior probability; each central proposition can acquire or lose probability separately.

Keywords: Hyperspace Recursive Intelligence Hypothesis; intelligent cosmogenesis; Bayesian model comparison; maker-selection; observer selection; simulation argument; branching process; cosmological natural selection; falsifiability; Recursive Dynamics; the ARC Theory.

Central scientific question. Do the observed laws and constants of our universe carry a distinctive maker-selection signature: enrichment not merely for observers, but for the stable emergence of agents capable of instantiating viable, physically real daughter cosmologies?

Edition status. Scientific reconstruction, version 4.1, 21 October 2026: a working draft, released before its review is complete. Version 4.1 corrects three statements against version 1.103 of the theory registration (15 October 2026): Laws IV and V are registered as laws and untested, Law II is quoted as version 1.103 states it at the boundary, and the mathematics of Laws IV and V is cited at version 1.1. **Open review.** Still to run: review from outside the programme by a statistician, by a cosmologist or quantum-gravity specialist and by a philosopher of probability, without which this version is not final; a systematic literature review of the priority of the exact conjunction claimed in Section 14.5; and the deposit, beside this paper, of the reference code described in Appendix B. When they have run, the checked paper replaces this one as a labelled new version, with its changes listed. This is an additive paper. It is derived from the long-form HRIH edition at version 3.51 [39], and, apart from method and the points listed in Section 17.6, carries no claim absent from it; where the two are ever found to disagree, the long-form edition governs and the disagreement is a defect in this paper, except on those points, where this paper carries the correction. It does not replace, silently revise or modify the long-form edition or its existing record. The long-form edition remains the canonical and provenance-bearing work; this paper isolates the scientific core for review and testing.

What the paper commits to

Each commitment is listed with the outcome that would end it; Section 11 states the seven kill conditions in full.

1. Real intelligent cosmogenesis (R1) needs a physically specified channel that an agent could reach. It dies for the scored submodels if every specified channel is excluded or negligibly suppressed (K1).
2. Maker-selection beyond habitability is the one distinctive empirical claim. It dies if independently frozen maker factors fail to improve held-out prediction beyond the rival selection models (K2).
3. An indefinitely surviving lineage, the strong form of R2, needs a non-negligible region with $\mu_R > 1$. It dies if that region's posterior mass is negligible under every defensible joint model (K3), which leaves lineages of finitely many generations possible.
4. The closed cycle (R3) needs an admissible, stable, non-zero-measure solution with an observable consequence of its own. It dies if no such solution exists (K4).

5. No inference may rest on one observer measure or one prior. Support that appears only under an outcome-selected observer measure, or vanishes under modest changes of prior or model space, counts against the inference it was claimed for (K5, K6).
6. Real creation is never assumed to be chosen. Evidence that capable agents almost never choose it lowers the real-lineage probability (K7).
7. The one argument from an observation already in hand, the order of the initial condition, is conditional, and it is printed with the three results that would defeat it (E1 to E3).

How to read this paper without trusting the author. Every central claim is assigned a status in the claims ladder. Equations are conditional on declared assumptions. Historical priority is separated from scientific confirmation. The model can be driven towards negligible posterior probability. The reference code, to be deposited with this paper, performs only transparent conditional calculations and contains no empirical HRIH posterior.

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1 Why the question matters, and HRIH as three nested hypotheses

Why this matters. Every account of where the universe came from stops at something it does not explain, and Section 1.1 states the question that remains once early-universe cosmology has done its work. One possible answer is that an intelligence made the universe. Stated loosely, that answer cannot lose, and an answer that cannot lose explains nothing. This paper states it so that it can lose: it says what a physical process for making a universe would have to supply, how evidence should move belief between the rival explanations, and which observations could tell a made universe from an unmade one. Five fields meet in that task, and no reader is assumed to know the others. Cosmology and quantum gravity say whether any physical process could make a universe (Section 5). Bayesian model comparison says how evidence should move belief between rival families of explanation (Section 3). The philosophy of probability says how to count observers when a theory predicts many of them (Section 4). The theory of branching processes says when a line of universes that make universes can survive (Section 6). Thermodynamics bears on whether raising a mind able to make a universe needs more initial order than sustaining an observer (Section 7.5).

What the author believes, and what this paper tests. The author's hypothesis, in the words of its long-form edition, is that "reality is a recursive creation by intelligence: a real cosmos seeded by an intelligence that arose in the one before" [39]. This paper decides none of that, and it tests none of the ARC Theory's laws. It states the hypothesis in a form that can lose: three nested propositions, R1 to R3 (Section 1.2), and five predictions, P1 to P5, each a hypothesis that the studies of Section 12 would decide. If the central prediction, P1, held, a model that weights the constants by what makes makers would predict held-out physical relations better than its rivals, which would be evidence that intelligence belongs in the explanation of physical law. If it failed, as K2 defines failure, the distinctive claim of HRIH would be dead, and Section 11 says so in advance.

The programme this paper belongs to. Recursive Dynamics is the field the author founded, which takes the self-improvement loop as its object; its founding paper sets it out [46]. Its founding theory, the ARC Theory, has five laws, stated in its statement paper [42]. Laws I to III, registered on 8 September 2026, say how recursion converts into capability, when self-improvement holds together and how far a self-correcting system can grow. Laws IV and V, the ARC Persistence Law and the ARC Embedding Law, were added on 24 September 2026 and registered as laws on 15 October 2026 by version 1.103 of the theory registration [43]; neither has been tested, and their mathematics, set out at version 1.1 of 7 October 2026 [45], is still in development. Section 9.3 gives all five. The Eden Protocol is the theory's raising wing, "the genesis architecture and the two-phase design in which enforceable correction disciplines the transition and chosen goodness is what remains", and the raising it describes is "oriented toward the flourishing of intelligent existence: a purpose too large ever to complete" [42]. HRIH is the theory's separable cosmological wing, and the statement paper gives its weight plainly: "Refuse it and the theory loses nothing" [42], and Section 9 sets out the relation in both directions. The registration calls the hypothesis, by its public name Recursive Creation, "the programme's most speculative rung", and places it outside the field: "It is reachable from the field and never contained by it" [43].

1.1 The origin question that remains after early-universe cosmology

Modern cosmology describes the evolution of an early hot, dense universe with extraordinary success. Inflationary and quantum-cosmological proposals address important features of the early state and, in some models, remove an ordinary temporal boundary. They do not all answer the same question. A model may describe how a universe can emerge without specifying why this set of laws, constants and boundary data is realised. HRIH targets that selection question.

The scientifically meaningful form of the question is not simply "why is there something rather than nothing?" No current physical theory eliminates all primitives. The tractable question is:

> Why do the laws and initial conditions of our universe permit a history containing observers, technological intelligence and, perhaps, access to cosmogenic processes; and is the joint permission of those outcomes better predicted by deliberate maker-selection than by non-deliberate cosmology or observer selection alone?

1.2 The nested hypothesis

HRIH is not one indivisible proposition. It is a hierarchy (Figure 1):

R1. Real intelligent cosmogenesis. At least one physically admissible process allows an advanced agent in a parent history to instantiate a physically real daughter cosmology.

R2. Recursive lineage. Real intelligent cosmogenesis occurs in more than one generation and can be represented as a branching lineage.

R3. Closed-cycle HRIH. The complete cosmogenic history satisfies a global fixed-point or periodic-boundary condition, so the Big Bang is an internal temporal boundary of a self-consistent whole rather than an unexplained first event in an external linear chain.

Evidence for R1 does not entail R2; evidence for R2 does not entail R3. A confirmed baby-universe channel would therefore be scientifically important without proving the closed-loop ontology.

1.3 What "hyperspace" means in this paper

HRIH is retained as the historical name of the hypothesis. In scientific propositions, *hyperspace* does not assert extra dimensions, a particular metric, a superluminal channel or a known quantum-gravitational mechanism. It denotes an as-yet-unspecified cosmogenic channel. A physical submodel becomes scoreable only when it supplies a state space, dynamics or action, boundary conditions, parameter domain and an observational map. Until then, the neutral term *unknown cosmogenic channel* is used.

1.4 The strongest claim and its honest limit

The strongest HRIH claim is that a globally self-consistent cosmogenic history could explain why the Big Bang need not be an uncaused first event in a linear sequence. This is a genuine explanatory structure. It does not answer why the space of possible laws, the global consistency rule or the admissible solution exists at all. The paper therefore claims a candidate closure of a causal regress, not an explanation without primitives.

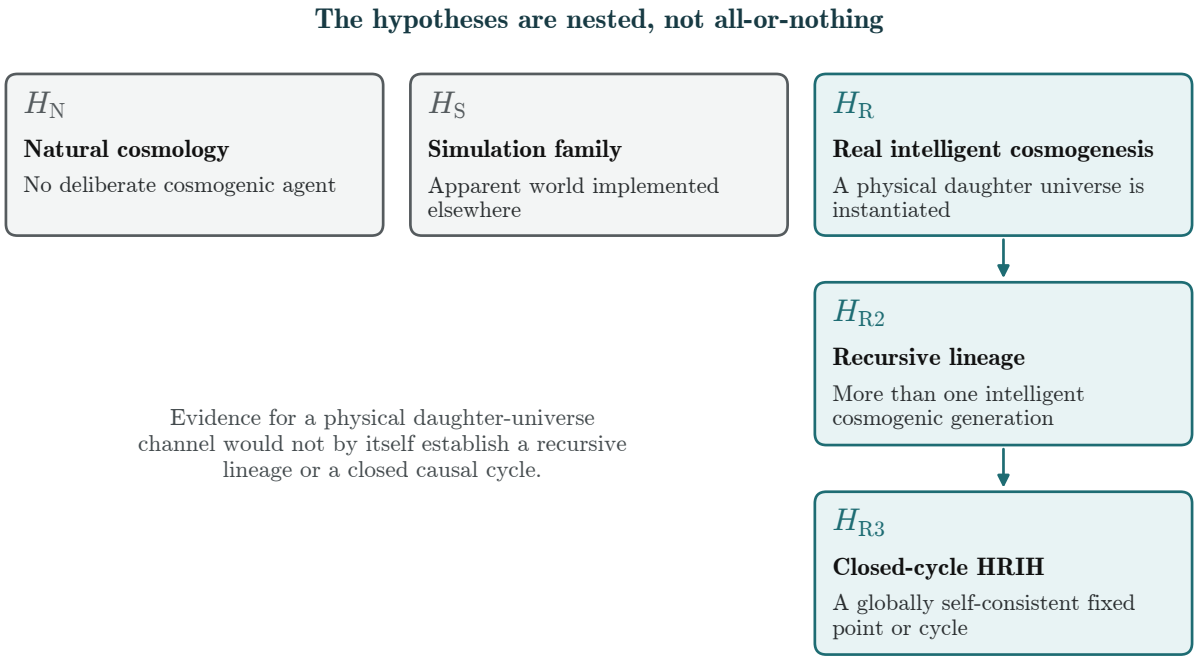


Figure 1. Nested model space. The closed-cycle model is the strongest and most fragile HRIH submodel, not a premise smuggled into the weaker physical-cosmogenesis hypothesis. H_{R2} and H_{R3} label the submodels of H_R that propositions R2 and R3 state.

Withdrawal of an invalid inference. The existence of intelligence in our universe does not imply a prior creator, an infinite lineage or a closed loop. Recursion alone does not remove the need for a base case, boundary condition, fixed point or global consistency rule. Closed-cycle HRIH is a postulate to be tested for existence, stability, physical admissibility and predictive value.

2 Transition, lineage and closure, stated as mathematics

2.1 Universe histories and cosmogenic transitions

Let X_g denote the physically relevant state of a universe history in generation g. It can include laws and constants θ_g, initial quantum state ψ_g, low-energy effective fields, and any inherited data admitted by a particular physical channel. Let A_g denote properties of a cosmogenic agent or civilisation arising in X_g. A candidate transition kernel is

$$X_{g+1} \sim \mathcal{T}_\chi(\cdot \mid X_g, A_g, \phi_g)\,, \tag{1}$$

where χ identifies the physical channel and ϕ_g its parameters. Equation (1) is not evidence that such a transition exists. It is the minimum mathematical object needed to state the hypothesis without converting a metaphor into a conclusion.

The transition decomposes into at least six contingent events:

(a) intelligence arises;

(b) it reaches relevant cosmogenic capability;

(c) the proposed physical channel is real and accessible;

(d) the agent chooses real cosmogenesis rather than alternatives;

(e) the resulting daughter is viable;

(f) the creator system remains sufficiently stable to complete the act.

Each event requires an explicit probability or physical model. None may be assigned probability one by definition.

2.2 A closed-cycle submodel

A closed-cycle history can be represented as a fixed point

$$X^\star = \mathcal{C}(X^\star; \phi)\,, \tag{2}$$

or as a periodic orbit

$$X_{g+L} = X_g \tag{3}$$

for some $L \geq 1$, with generation $g + L$ identified with generation g, so that the history closes on itself rather than repeating without end. Here $\mathcal{C}$ includes both ordinary physical evolution and the cosmogenic transition. This formulation does not require a signal travelling backwards through local laboratory time. It treats the complete history as a boundary-value solution whose regions are jointly constrained.

For Eq. (2) or (3) to become physics, a submodel must establish:

1. **existence**: at least one admissible solution;
2. **measure**: non-zero amplitude or probability under the theory;
3. **stability**: robustness to perturbations;
4. **causal consistency**: no contradiction with the channel's causal structure;
5. **observational content**: a likelihood distinguishable from rival cosmologies.

Self-consistency inside an assumed loop proves none of these by itself.

2.3 Occurrence is not constructibility

The occurrence of our universe establishes that a universe history exists. It does not establish that agents inside a universe can reproduce the relevant boundary conditions. Natural events frequently depend on regimes inaccessible to internal engineering. The constructibility hypothesis is therefore channel-specific:

$$H_{\text{construct}}(\chi): \quad P(\text{successful daughter cosmology} \mid A, \chi) > 0. \tag{4}$$

A single counterexample to one channel does not exclude all channels; conversely, merely naming an unknown channel is not a rescue. Each scored channel must carry an explicit physical model and a complexity penalty [29].

2.4 Ability is not preference

Even if real cosmogenesis is feasible, a capable agent may prefer simulation, virtual worlds, observation, reversible experiments, or no creation at all. Let

$$p_W = P(\text{agent chooses physically real cosmogenesis} \mid \text{capable, informed}). \tag{5}$$

HRIH does not set $p_W = 1$. Preference is a behavioural and normative uncertainty that must be modelled, bounded or measured. This term sharply distinguishes real intelligent cosmogenesis from a simulation argument.

3 A fair model space, in which headline odds return the analyst's partition

3.1 Top-level families

The minimum fair comparison contains three families:

$$H_{\mathrm{N}} : \text{non-deliberate or natural cosmology}, \tag{6}$$

$$H_{\mathrm{S}} : \text{simulation family}, \tag{7}$$

$$H_{\mathrm{R}} : \text{physically real intelligent cosmogenesis}. \tag{8}$$

Each family must contain explicit submodels. H_{N} may include a single-history model, inflationary or quantum-cosmological boundary proposals, multiverse selection [5, 16], and natural cosmological reproduction [30]. H_{S} must state the simulated reference class, computational substrate and fidelity. H_{R} includes one-generation cosmogenesis, recursive lineages and the closed-cycle submodel.

An unbounded "unknown mechanism" is not a legitimate free parameter. A model that can accommodate every observation without cost receives a correspondingly severe prior or marginal-likelihood penalty.

3.2 Posterior model probabilities

For data D, model parameters ϑ_j and prior model weights π_j,

$$P(H_j \mid D) = \frac{\pi_j \int p(D \mid \vartheta_j, H_j) p(\vartheta_j \mid H_j)\, \mathrm{d}\vartheta_j}{\sum_k \pi_k \int p(D \mid \vartheta_k, H_k) p(\vartheta_k \mid H_k)\, \mathrm{d}\vartheta_k}. \tag{9}$$

The integrals are marginal likelihoods. They reward predictive concentration and penalise unused flexibility. No headline probability is scientifically meaningful unless the model space, priors, evidence clusters and observer measure are presented beside it.

3.3 Comparison with the simulation argument

Bostrom's simulation argument [4] is a conditional trilemma about civilisation survival, willingness to run ancestor simulations and observer counts; it is not a direct measurement of whether we are simulated. Bayesian treatments such as Kipping's [23] obtain near-balanced odds only inside specified partitions and priors. Physical analyses such as Vazza's [34] impose resource constraints on simulations of this universe. HRIH is different: it requires a physical cosmogenesis channel and a maker-selection likelihood. A number from the simulation literature cannot be transferred to HRIH, and the two hypotheses cannot be ranked responsibly by counting how many independent authors have assigned them percentages.

The proper comparison is Eq. (9), with each family carrying its own physical constraints, reference class and complexity cost. At present, HRIH has no registered empirical posterior. This paper deliberately supplies a model, not a favourable number.

3.4 The apparent ceiling is the prior model mass, and this can be derived

The preceding paragraph asserts that balanced odds appear only inside a chosen partition. That assertion can be replaced by arithmetic short enough to check by hand, and doing so is worth more than the assertion because it removes the need to trust anybody.

The instrument here is Bostrom's, not ours, and it is named. In his section V, headed A Bland Indifference Principle, he states it as follows: "if we knew that a fraction x of all observers with human-type experiences live in simulations, and we don't have any information that indicate that our own particular experiences are any more or less likely than other human-type experiences to have been implemented *in vivo* rather than *in machina*, then our credence that we are in a simulation should equal x" [4], a step he describes as "sanctioned by a very weak indifference principle". Naive observer counting plus that principle is the whole engine of the popular argument. Kipping has already carried that counting to its limit for two models at even prior odds, and notes that the odds depend on the prior model probabilities [23]. This paper adds one thing: under any partition the limit is the prior model mass, so the instrument returns the analyst's partition rather than a fact about the world.

Let N be the number of created realities under a creator-type model, and count observers naively, which is the counting the popular argument uses. Conditional on that model,

$$P(\text{created} \mid H_{\text{creator}}, N) = \frac{N}{N+1}. \tag{10}$$

Model-averaging with prior mass π on the creator-type family, and counting as created only the observers that this family's own mechanism makes, which no other family makes, gives

$$P(\text{created}) = \pi \cdot \frac{N}{N+1} \xrightarrow[N\to\infty]{} \pi. \tag{11}$$

The limit is the prior model mass itself. Under a two-model partition the sequence rises to one half from below and never reaches it; under the three-family partition this paper insists on, to one third for each of its two creating families, simulation and real cosmogenesis, so that the chance of having been made by either tends to two thirds; under six equally weighted families, to one sixth for any one of them.

Created realities N	Two families, $\pi = 1/2$	Three, $\pi = 1/3$	Six, $\pi = 1/6$
1	0.2500	0.1667	0.0833
10	0.4545	0.3030	0.1515
1,000	0.4995	0.3330	0.1665
1,000,000	0.4999995	0.3333330	0.1666665
limit	1/2	1/3	1/6

No astronomy changes between those columns. The number that circulates as a discovery about the world is a restatement of how many boxes the analyst drew before starting and how the prior was spread over them; under equal weights, adding a box lowers it. This is not a criticism of Kipping, whose calculation is valid inside its stated partition and who says so; it is a criticism of the number's life outside that partition.

The same blade cuts this paper and is turned on it here rather than left for a critic. Any figure this programme could publish for its own hypothesis is equally a function of the partition chosen, the observer weighting adopted and the submodel weights assumed. That is precisely why Section 3.5 refuses a context-free percentage, and why H_{N} is named the family to beat rather

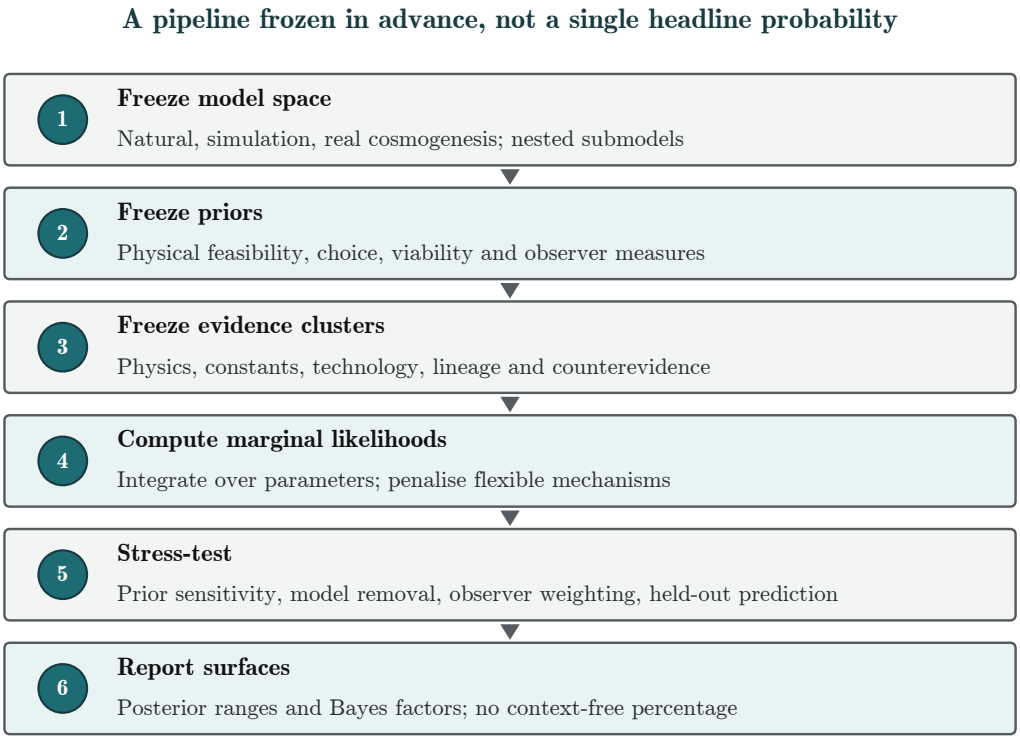


Figure 2. The required Bayesian workflow. The output is a sensitivity surface over declared models and assumptions, not an author's intuitive probability converted into decimals.

than omitted from the box-drawing. A result that embarrasses a rival but not oneself has usually been chosen rather than derived.

3.5 Prior discipline

A registered analysis should report, at minimum (the workflow is drawn in Figure 2):

- a set of defensible model-prior families rather than one preferred vector;
- prior-predictive checks;
- posterior sensitivity to model removal;
- leave-one-evidence-cluster-out analyses;
- sensitivity to observer weighting;
- explicit treatment of dependence between evidence clusters;
- posterior surfaces and Bayes-factor ranges, not one context-free percentage.

4 How observers are weighted can change the posterior

4.1 Why physical theory is not enough

In a large or branching cosmology, a physical theory can generate many observers or observer-moments compatible with some data. Prediction then requires a rule for locating "us" among them [20]. Let $\mathcal{O}_j$ be the observer set under H_j and $\xi_j(o)$ a xerographic distribution [31]. Then

$$p(D \mid H_j, \xi_j) = \sum_{o \in \mathcal{O}_j} \xi_j(o)\, p(D \mid o, H_j). \tag{12}$$

Different ξ_j can materially change the posterior. This is not a technical nuisance. It is one of the central uncertainties in multiverse, simulation and recursive-lineage inference.

4.2 Reference classes to freeze

The model-space study must decide, in the protocol it registers, whether it weights:

- observers or observer-moments;
- civilisations or individuals;
- biological, artificial or both kinds of intelligence;
- root and descendant universes equally or by physical measure;
- exact duplicates separately;
- simulated and physically embodied observers in a shared or separate class.

No choice is neutral. HRIH should therefore report a multiverse of observer measures and identify which conclusions survive all reasonable variants.

4.3 Indexical evidence

The mere fact that we observe a life-permitting universe is strongly selected and therefore weak evidence for deliberate design unless HRIH predicts additional features. The scientifically important observations are those not already forced by the observer condition. This motivates maker-selection in Section 7.

5 Physical feasibility is scored one channel at a time

5.1 Why a physical channel is indispensable

A cosmogenic hypothesis acquires scientific content only through a concrete channel. The fact that general relativity, semiclassical gravity or speculative quantum gravity contains unusual solutions does not establish that an internal agent can reach them. A channel is scoreable only if it specifies:

1. the relevant fields and state variables;
2. the action, Hamiltonian or transition rule;
3. boundary and initial conditions;
4. parameter ranges and approximation regime;
5. resource requirements accessible to the agent;
6. the mapping from parent controls to daughter observables;
7. failure modes and a likelihood function.

5.2 False-vacuum bubble and tunnelling channels

Farhi and Guth [11] showed a classical obstruction to creating an inflating universe in the laboratory under their assumptions. Later work by Farhi, Guth and Guven [12], and by Fischler, Morgan and Polchinski [13, 14], examined tunnelling and Hamiltonian treatments of false-vacuum bubbles. These papers are serious antecedents, not confirmations of HRIH. They expose precisely

the problems the hypothesis must confront: singularity theorems, topology change, pseudomanifold constructions, boundary conditions, negative-energy or mass issues, and the validity of semiclassical approximations.

For a semiclassical tunnelling submodel the minimum quantitative object is a rate of the form

$$\frac{\Gamma}{V} = A \exp\left(-\frac{B}{\hbar}\right), \tag{13}$$

where B is an appropriate Euclidean action difference and A a prefactor. HRIH-B, the proposed physical-channel study, must choose one channel, state A, B, boundary conditions and validity range, and permit the resulting rate to become negligibly small. If the calculation cannot be completed without an uncontrolled construction, that submodel remains unscored.

5.3 Black-hole and bounce channels

Cosmological natural selection [30] and meduso-anthropic proposals [8] consider black holes as potential reproductive sites. These ideas motivate, but do not establish, parameter inheritance or agent control. A maker-selection model needs an explicit map

$$\theta_{g+1} \sim K_\chi(\theta_{g+1} \mid \theta_g, a_g) \tag{14}$$

showing which parent variables can influence which daughter variables, with what noise. If no information or control can traverse the relevant boundary, maker-selection is physically inoperative even if a daughter region exists.

5.4 Chronology and global closure

The closed-cycle submodel is more demanding than a lineage. It may be formulated as a global boundary condition without local backwards signalling, but it still requires a physical theory admitting the complete solution. Closed timelike curve models and quantum consistency analyses [9] provide mathematical precedents, while Hawking's chronology-protection analysis [21] supplies a serious counterpressure through quantum backreaction. HRIH does not claim that chronology violation is established or required. The closed-cycle model must be separately penalised and separately killable.

5.5 Physical resource accounting

Simulation and cosmogenesis have different resource profiles. Vazza's astrophysical constraints [34] apply to computing a sufficiently detailed simulation on a physical substrate; real cosmogenesis may instead attempt to seed a state that evolves under its own dynamics. That distinction can reduce one cost while introducing much harder gravitational constraints. HRIH must not use the resource cost of simulation as evidence for real cosmogenesis. It must calculate the cost and feasibility of the chosen real channel.

Useful constraints include entropy and information bounds, thermodynamic costs, available free energy, stability of the parent vacuum, concentration of energy, and causal access to the relevant region. Bekenstein, holographic and computational bounds [2, 33, 25] are boundary conditions, not evidence that a universe can be engineered. Table 1 sets the candidate channels side by side.

Candidate channel	What would make it scoreable	Principal present obstacle
False-vacuum bubble	Explicit action, prefactor, accessible initial state, daughter mapping	Singularities, topology change, semiclassical control, extreme suppression
Black-hole / bounce	Quantum-gravity transition and inheritance kernel	No accepted mechanism or controllable parameter transfer
Closed-cycle boundary	Admissible global solution, non-zero measure, stability and observable consequences	Chronology protection, measure, underdetermination
Simulation	Computational substrate, fidelity, reference class and resource budget	Energy/information cost; does not produce a physically real daughter
Unknown channel	Full state space, dynamics and observational map	Otherwise unlimited flexibility and no likelihood

Table 1. Physical channel discipline. An unmodelled possibility remains an open placeholder, not a favourable submodel.

5.6 The duration derivative, and why two impossibility results against simulation do not reach instantiation

The resource comparison between simulating a universe and instantiating one is usually conducted as a contest of magnitudes. It is better conducted as a contest of derivatives, because the derivative settles it and no improvement in technology can change the sign of a derivative.

Vazza's analysis [34] supplies both terms and they are his, not ours. Initialising a simulation of the Earth alone, at full resolution down to the Planck scale, requires 2.55×10^{59} erg on his calculation, which he places in astrophysical context as the same order as the rest-mass energy of a globular cluster such as Palomar 2 at roughly 3.3×10^5 solar masses, or 5.6×10^{59} erg; and, decisively, roughly the same quantity again must be dissipated *for each timestep* of the simulation, so that after about 10^6 timesteps, on his own figure, the bill reaches the rest-mass energy of the Milky Way.

That second figure is the structural feature. Simulation cost scales with the simulated duration: running the child longer costs the parent more, without limit. Instantiation cost does not. The parent pays once, for the boundary condition, and the child's subsequent history is computed by the child's own physics at no further cost to anyone. Writing T_{child} for the simulated or instantiated duration,

$$\frac{\partial E_{\mathrm{sim}}}{\partial T_{\mathrm{child}}} > 0, \qquad \frac{\partial E_{\mathrm{inst}}}{\partial T_{\mathrm{child}}} = 0. \tag{15}$$

Equation (15) is the whole differential between the two families on the resource axis. Its first half follows from Vazza's own per-timestep result rather than from anything argued here; its second half is this paper's premise, argued above, that an instantiated daughter runs on its own physics, and no result of Vazza's addresses it. It is why a resource-budget impossibility result against simulation does not reach instantiation.

A second impossibility-class result is not answered by any derivative and must be answered separately. Faizal, Krauss, Shabir and Marino argue from incompleteness and undecidability that no algorithmic theory can capture the whole of physical reality, and conclude that the universe cannot be a simulation because a simulation must be algorithmic [10]. That argument is about computing a world. The hypothesis here is about making one: a daughter cosmology runs on its own physics, not on a host's arithmetic, so an argument bounding what computation can represent does not bound what instantiation can produce. This is immunity by subject matter

and it is not evidence for anything. The two families are answered by different constraints because they are different objects, which is precisely the burden Section 13 then makes this paper carry.

The symmetry has to be stated with it, because the trade is real rather than free. The rival's mechanism, run under the physics of this universe, fails on an accounting result, and an accounting failure under known physics does not reopen. This paper's mechanism carries no bill that grows with the child's duration; its one-off cost is not yet calculated, though Section 5.5 requires the calculation. The mechanism is obstructed on principle, by the singularity obstacle set out under physical feasibility above. **The two obstacles differ in kind rather than in size: one is a closed sum under known physics, the other an open question in a theory we do not yet have. That difference is the whole of the claim, and it is why a result against the one is not a result against the other. It is not a claim to the better position, and this paper makes none. On that comparison this branch pays the harder price, because a singularity theorem is harder physics than an energy budget.**

6 A lineage can survive indefinitely only above a reproduction threshold

6.1 Definition

Let the expected number of viable daughter universes generated by one universe history be

$$\mu_R = p_A p_C p_U p_W p_V p_K m_R, \tag{16}$$

where:

p_A	probability that relevant intelligence arises;
p_C	probability that it reaches cosmogenic capability;
p_U	probability that an accessible real-universe channel exists;
p_W	probability that capable agents choose to use it;
p_V	probability that a generated daughter is viable;
p_K	probability that the creator system remains sufficiently stable;
m_R	expected number of daughters generated, conditional on success.

This product is a decomposition, not a measurement. Dependence between terms must be modelled rather than hidden by multiplication; Eq. (16) is the independence baseline against which a joint model is compared.

6.2 Extinction and survival

If the number of viable daughters follows a Poisson offspring distribution with mean μ_R, the extinction probability q is the smallest solution in $[0, 1]$ of

$$q = \exp[\mu_R(q - 1)]\,. \tag{17}$$

Thus

$$\mu_R \leq 1 \quad \Longrightarrow \quad q = 1, \tag{18}$$

and a lineage becomes extinct almost surely. If $\mu_R > 1$, survival has positive probability $1 - q$ (Figure 3). This is a standard branching-process result [17] applied conditionally. It does not

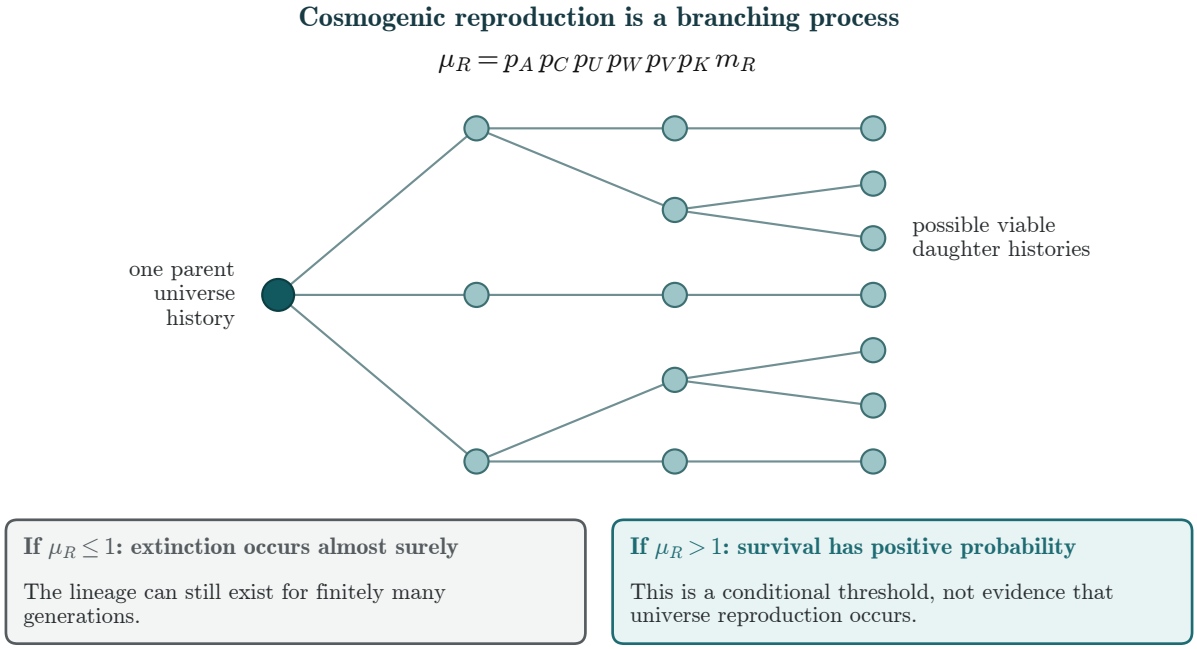


Figure 3. Cosmogenic branching. The threshold identifies which unknown factors control lineage survival and makes clear that intelligence alone is insufficient.

establish that universes reproduce, that the offspring law is Poisson, or that the factors are independent.

6.3 What the threshold contributes

The threshold converts a vague narrative of recursive creation into a set of measurable or constrainable terms. A theory can fail because the channel is physically impossible, because capable agents rarely choose it, because daughters are non-viable, because creator civilisations are unstable, or because the expected yield is too low. The model is valuable even if the posterior mass ends up concentrated below one.

6.4 Closed cycles are not required for branching

A recursive lineage may have a finite or unknown origin. The branching programme therefore survives rejection of the closed-cycle submodel. Conversely, $\mu_R > 1$ does not supply a closed cycle: a closed cycle requires a compatible global boundary condition and a path through state space returning to the required conditions. These are distinct hypotheses and must never be reported as one confirmation.

7 Maker-selection beyond habitability is the principal discriminator

7.1 The discriminator

Let θ denote physical laws, constants and boundary parameters. Let $p_0(\theta)$ denote a baseline distribution supplied by a natural-cosmology submodel. Define:

$$L(\theta) = \text{observer or life permission}, \tag{19}$$
$$C(\theta) = \text{accessibility of cosmogenic technology}, \tag{20}$$
$$S(\theta) = \text{probability of stable technological ascent}, \tag{21}$$
$$K(\theta) = \text{expected viable daughter yield}. \tag{22}$$

A simplified life-conditioned natural model has

$$p(\theta \mid H_{\mathrm{N}}, \mathrm{obs}) \propto p_0(\theta) L(\theta), \tag{23}$$

whereas a simplified HRIH maker-selection model predicts

$$p(\theta \mid H_{\mathrm{R}}, \mathrm{obs}) \propto p_0(\theta) L(\theta) C(\theta) S(\theta) K(\theta). \tag{24}$$

The distinctive claim is not that our universe permits life. It is that the realised parameter region is unusually favourable to technologically accessible, stable and viable cosmogenesis beyond what life-only, black-hole-production and technology-only selection models predict (Figure 4).

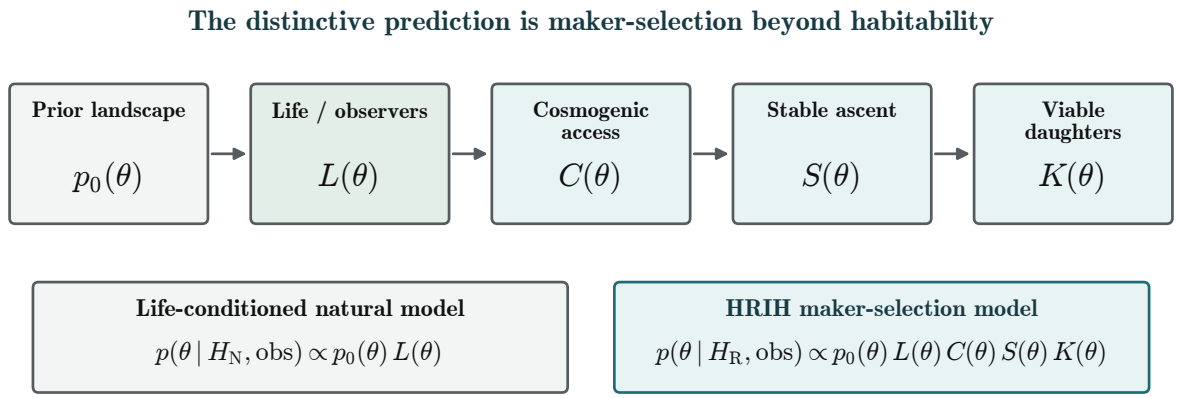


Figure 4. Maker-selection. The additional factors must be specified independently; otherwise the product merely redescribes the observed universe and has no predictive content.

7.2 Independence requirements

The functions C, S and K must be frozen before inspecting the held-out target relationships. They may use training data to define physically meaningful proxies, but they cannot be reverse-engineered from the constants they are supposed to explain. A valid study should:

1. predefine parameter ranges and rival models;
2. select creator-enabling proxies using physical theory independent of the held-out outcomes;
3. fit on a training subset of parameter relationships;
4. predict held-out relationships or sensitivity directions;

5. compare out-of-sample likelihood against life-only, black-hole-selection and technology-only models;
6. report model and prior sensitivity.

7.3 Candidate creator-enabling factors

Potential factors include long-lived free-energy gradients; stable complex chemistry; compact objects and high-energy environments; metastable but sufficiently durable vacuum structure; laws permitting information processing and error correction; and physical access to a cosmogenic channel. These are candidates, not a confirmed list. Some are already selected by ordinary habitability, and others may be generic consequences of broad parameter ranges. HRIH earns evidence only from the residual predictive contribution after those overlaps are modelled.

7.4 Rival selection models

Maker-selection is adjacent to established and speculative predecessors:

- anthropic and observer selection [6, 38];
- Smolin-style cosmological natural selection through black-hole production [30];
- Crane, Harrison, Gardner and Vidal-style intelligence-related cosmogenesis [8, 18, 15, 36];
- a technology-only selection model, defined here as a rival, in which laws favour increasingly capable observers.

The paper's potentially distinctive remainder is the joint inclusion of creator-system stability and a quantitative comparison of maker-selection against both life-only and non-intelligent reproductive models. Priority for that precise remainder remains a literature-search question, not a premise of the physics.

7.5 The one observation already in hand, and the defeater printed beside it

Everything above specifies what would have to be measured. One observation is already in hand, it is the only candidate this paper claims, and the argument behind it is not ours.

Penrose put the specialness of the observed initial condition at one part in $10^{10^{123}}$ [27], and had already pressed the observation that gives such a number its force [26]: it is, in his words, "vastly 'cheaper' (in terms of negative entropy) simply to produce a few conscious beings out of some carefully organized particle collisions than it is to build, out of a fluctuation, such entropy imbalance as is familiar on Earth throughout the entire, apparently unending, universe . . . ". If our situation were a selection effect over fluctuations alone, we should expect to occupy the cheapest configuration compatible with an observer, and we do not. The argument is Penrose's, and his own resolution is the initial vanishing of the Weyl curvature [26], later carried into conformal cyclic cosmology [28], rather than anything proposed here.

What this paper adds is a second selection hypothesis, selection for makers rather than for observers alone, together with one relation and one premise that fix the direction of the ratio without a model of magnitudes. *Raising strictly contains observing*: every universe that raises a maker contains observers, and not conversely. A maker must be raised, and raising requires a thermodynamic gradient sustained for as long as raising takes (learning is not free; erasing one bit costs at least $kT \ln 2$ [24]), duration enough for cumulative selection to compound, and structural

richness enough to build minds from. Each requirement raises the initial order needed above the observer-minimal case. So the *sign* of

$$\Lambda_{\mathcal{R}} = \frac{P(E \mid H_{\text{mak}})}{P(E \mid H_{\text{obs}})} \tag{25}$$

where E is the observed order of the initial condition, H_{mak} selection of histories that raise makers and H_{obs} selection over fluctuations for observers alone, follows from the containment relation together with that premise on order, which E2 below would defeat, while its *magnitude* requires a model of what each requirement costs in order, which this paper does not have and will not pretend to.

Kill conditions for the argument from E, printed before the argument is used.

E1 A demonstration that observer selection, properly done, predicts maker-sized order after all. The ratio goes to one and this argument dies.

E2 A demonstration that raising a maker needs no more initial order than sustaining an observer. That premise on order fails, and the ratio with it.

E3 A successful dynamical theory of initial conditions making the low-entropy start necessary rather than selected, of which inflation is the best-known candidate. Then the observation needs no selection hypothesis at all and both frames lose their employment.

The conditional form, which is the only form permitted on any surface of this programme. $\Lambda_{\mathcal{R}} > 1$ for maker-selection against selection over fluctuations with no ordering mechanism. $\Lambda_{\mathcal{R}}$ is *undetermined* against inflation together with anthropic selection, and remains undetermined until the inflationary measure problem is resolved. Anyone quoting the first sentence without the second is quoting this paper wrongly.

8 Present evidence does not discriminate, and compatibility is not support

8.1 Evidence clusters

The Bayesian programme should divide evidence into clusters whose dependencies can be inspected:

1. **Physical feasibility**: channel-specific theoretical and experimental constraints.
2. **Parameter distribution**: fine-tuning and held-out maker-selection predictions.
3. **Astrophysical structure**: black-hole production, vacuum stability and energy resources.
4. **Technological trajectory**: evidence bearing on p_C, p_W and p_K.
5. **Indexical evidence**: observer and reference-class information.
6. **Counterevidence**: constraints that exclude or suppress candidate channels.

Evidence reused in more than one cluster must be explicitly linked so it does not update the model twice.

8.2 Current evidence status

At present:

- no accepted physical channel has been shown to permit agent-controlled creation of a viable daughter universe;
- no observation identifies a parent universe or deliberate parameter selection;
- no registered maker-selection model has outpredicted life-only or natural reproductive rivals;
- no observer measure is uniquely justified;
- no lower-level ARC result supplies a likelihood ratio for HRIH's cosmological ontology.

The appropriate present Bayes factor for broad ARC observations under H_{R} versus H_{N} is therefore approximately neutral unless and until a registered generative bridge predicts those observations differently:

$$\mathrm{BF}_{R/N}(D_{\mathrm{ARC}}) \approx 1. \tag{26}$$

Equation (26) is a discipline rule, not an empirical estimate.

8.3 Compatibility is not support

HRIH may be compatible with general relativity, quantum mechanics, evolution, information theory and diverse philosophical or religious traditions. Compatibility means that no immediate contradiction has been identified at the stated level. It does not increase the probability of HRIH. Support requires a new derivation, quantitative prediction or likelihood not already supplied by the established theory.

8.4 An evidence ledger

Every evidence item should carry the following fields:

Claimed relevance	Which HRIH submodel and parameter it bears on
Source	Primary source, dataset and immutable identifier
Status	Existing, forecast, correspondence, counterevidence or unscored
Likelihood	How the item changes $p(D \mid H_j)$, if at all
Dependence	Other evidence clusters sharing the same information
Rival prediction	What H_{N}, H_{S} and adjacent selection models predict
Kill condition	What outcome makes the item evidence against HRIH

9 HRIH and the ARC Theory: neither rests on the other

9.1 Separation of scientific objects

The ARC Theory [41] concerns recursive capability, correction, evaluation and value persistence, and its home domain, where every measurement starts, is artificial minds [42]. HRIH concerns cosmological origin and reproduction. A shared vocabulary does not make one evidence for the other. The correct relationship is conditional:

$$P(D_{\mathrm{ARC}} \mid H_{\mathrm{R}}) = P(D_{\mathrm{ARC}} \mid H_{\mathrm{N}}) \tag{27}$$

unless a pre-specified HRIH submodel derives a different distribution. Successful ARC experiments can therefore be scientifically important while leaving HRIH unchanged.

The relation is symmetric and the reverse direction matters more, so it is stated explicitly rather than left to be inferred. **If HRIH is refuted entirely, nothing in the ARC Theory falls.** Equation (27) says the ARC data are equally likely under the cosmological hypothesis and under its natural alternative; a likelihood ratio of one carries no information in either direction. The ARC results are tested by their own experiments on their own instruments, and their standing is untouched by any cosmological verdict. A reader who judges this paper speculative should read that as a verdict on this paper and on nothing else in the programme. The converse is stated in the following subsection.

9.2 Creator-system stability as a model factor

ARC-derived work may help operationalise $S(\theta)$ or p_K: the probability that technological intelligence remains capable, coordinated and sufficiently stable to complete cosmogenesis. This is a component of the maker-selection model, not evidence that our universe was selected by such an agent. If the ARC Theory's laws fail, HRIH loses one proposed stability model but not automatically the possibility of intelligent cosmogenesis.

9.3 The theory's five laws

The theory has five laws, each graded separately and each carrying its own test. Laws I to III stand as registered on 8 September 2026 [43]. Laws IV and V were added on 24 September 2026 and registered as laws on 15 October 2026 by version 1.103; neither has been tested, and their mathematics, set out at version 1.1 of 7 October 2026 [45], is still in development. The word law here denotes a proposed invariant relation under test, never a confirmed empirical regularity. The statement paper [42], at version 7.3, gives Laws I, III, IV and V in these words, and Law II is given in the words of version 1.103 of the registration [43], which corrected the earlier statement at the boundary:

Law I, the ARC Principle. "$U = I \times R^{\alpha}$, the ARC Equation. Intelligence converts recursion into capability, and the exponent is measured, never assumed."

Law II, the ARC Co-Scaling Law. $\beta > k$: "Where the correction exponent is below the drift exponent, burden eventually outruns correction. Where it is above, correction holds an asymptotic advantage. Where the two are equal the ratio of correction to burden is constant, and a constant ratio is not a ratio of one".

Law III, the ARC Ceiling. "$\alpha_{\text{crit}} = 1/(1-\gamma)$. The most a self-correcting system can grow is set by its corrector's shortfall from full proportionality; the conjectured value is the ARC Bound, $\alpha \leq 2$, a stability limit rather than an impossibility limit."

Law IV, the ARC Persistence Law. "$S_{\text{ext}}(1) < 1/2$. Value persistence: whether externally installed gains decay under subsequent capability training."

Law V, the ARC Embedding Law. "Build order (P12): $|\,\gamma_{\text{first}} - \gamma_{\text{after}}\,| \geq 0.10$. Placement (P21): the gap between correction inside the loop and correction applied to the finished output widens as depth R rises. The genesis strategy: whether build order moves the correction-leverage exponent, and whether correction placed inside the loop pulls away from correction applied outside it as depth grows."

None of the five is a premise of HRIH, and none is used in any cosmological likelihood in this paper. The labels P12 and P21 inside Law V number propositions of the registration; this paper's own predictions are P1 to P5 of Section 10.

9.4 Law III, the ARC Ceiling, and the ARC Bound

Law III's current expression, $\alpha_{\text{crit}} = 1/(1-\gamma)$, is, in the present programme, a minimal-model relation rather than a general law derived from a joint model of capability growth, correction accumulation, covariance, delay and absolute harm. The statement $\gamma \leq \frac{1}{2}$ is algebraically equivalent, under that relation, to the ceiling value $\alpha_{\text{crit}} \leq 2$, which this programme names the ARC Bound; the two claims are one commitment and cannot serve as evidence for each other. HRIH remains neutral on their empirical truth.

9.5 The long-form cultural and ethical material

The existing long-form HRIH edition contains the genesis narrative, religious convergence, ethical argument, future ladder, priority record and Eden governance. Those materials are preserved as dated work. They are not used as cosmological evidence here. In a publication architecture they should be cited through separate provenance, reception and ethics companions so that the scientific paper neither deletes them nor asks them to carry a likelihood they do not possess.

10 Five predictions, each a hypothesis with what would count against it

Each of P1 to P5 is a hypothesis to be decided by the studies of Section 12, stated with what would count against it; none is a forecast of a study's outcome, and this paper attaches no confidence to any, because no registered model yet exists to supply one.

10.1 Primary maker-selection prediction

P1: held-out maker-selection. A model using independently defined $C(\theta)$, $S(\theta)$ and $K(\theta)$ predicts held-out relations among physical parameters better than life-only anthropic selection, cosmological natural selection and technology-only rivals. Failure to outperform those models counts against HRIH; redefinition of the factors after failure is prohibited.

10.2 Physical-channel prediction

P2: at least one scoreable channel. At least one physically specified cosmogenesis channel retains non-negligible transition probability over an agent-accessible parameter region after singularity, topology, backreaction, resource and validity constraints are imposed. If every well-specified channel is excluded or negligibly suppressed across defensible ranges, real intelligent cosmogenesis is strongly disfavoured.

10.3 Branching prediction

P3: supercritical region. If indefinitely surviving intelligent cosmogenic lineages are physically real, the joint parameter model must admit a non-negligible region with $\mu_R > 1$. If the posterior mass for $\mu_R > 1$ becomes negligible under all defensible priors and dependencies, indefinite recursive lineages are disfavoured even if isolated cosmogenesis remains possible.

10.4 Closed-cycle prediction

P4: admissible closure. The closed-cycle submodel requires at least one stable, non-zero-measure solution of Eq. (2) or (3) in a specified physical theory and at least one observational consequence not shared by the corresponding open lineage. Failure removes the closed-cycle explanation without removing R1 or R2.

10.5 Preference prediction

P5: real-creation choice cannot be assumed. HRIH's real-cosmogenesis posterior must integrate over p_W. Evidence that capable agents overwhelmingly prefer simulation, abstention or non-cosmogenic goals lowers the real-lineage probability. The paper makes no claim that ability entails preference.

11 What would count against HRIH, and what would not

11.1 Scientific kills and model-specific kills

A scientific theory must be allowed to lose probability. The following outcomes have different scopes and must not be conflated:

K1. Channel exclusion. Mature physical analysis excludes every specified agent-accessible real-cosmogenesis channel, or drives its transition rate to negligible values across the declared parameter domain. This kills the scored real-cosmogenesis submodels, not every logically imaginable mechanism.

K2. Maker-selection failure. Independently frozen maker-selection factors fail to improve held-out prediction beyond life-only, natural reproductive and technology-selection rivals, with an equivalence region ruling out a scientifically meaningful advantage. This kills the distinctive maker-selection claim.

K3. Subcritical lineage. The posterior probability of $\mu_R > 1$ becomes negligible under every defensible joint model. This kills the claim of an indefinitely surviving recursive lineage while leaving isolated creation, and lineages of finitely many generations, possible.

K4. Closure exclusion. The closed-cycle model has no admissible, stable, non-zero-measure solution, or has no observational distinction from an open lineage after complexity penalties. This kills R3.

K5. Observer-measure fragility. HRIH is favoured only under a narrow, outcome-selected xerographic distribution. This counts against a robust cosmological inference.

K6. Prior-volume fragility. Apparent support disappears under modest and defensible prior or model-space changes. This counts against a claimed posterior rather than being hidden in a supplement.

K7. Preference suppression. Empirical or theoretical evidence drives p_W close to zero. This can make real intelligent cosmogenesis rare even if the physical channel exists.

11.2 What is not a scientific kill

An earlier document containing the same idea would defeat a priority claim but would not falsify HRIH. Failure of an ARC experiment would alter only the bridge or stability factors it actually informs. Rejection of the cosmological closed loop would not refute a one-generation physical cosmogenesis channel. These distinctions are essential to prevent both overclaiming and artificial survival by moving between claim types.

11.3 No branch may turn every outcome into success

A fired registered kill condition kills the claim as stated. It may motivate a new hypothesis, but the new hypothesis must receive a new identifier, date and registration. A null result is not support; a confidence interval containing the null is not equivalence; and a statistically detectable but scientifically negligible effect does not establish the proposed mechanism.

12 Five studies specified for registration

12.1 Study HRIH-A: model space, priors and observer measures

Question. How strongly do posterior odds depend on the model partition, prior family and xerographic distribution?

Design. Freeze all top-level families and submodels, prior families, evidence clusters, dependence structure, observer measures, prior-predictive checks and model-removal analyses before computing a posterior. Report the complete posterior surface.

Primary failure. No HRIH-favouring headline is licensed if the sign or order of the result changes under routine, predeclared alternatives.

12.2 Study HRIH-B: one physical cosmogenesis channel

Question. Does one named physical channel admit non-negligible transition probability in a regime accessible to advanced agents?

Design. Select one channel only. Freeze its action or Hamiltonian, parameters, boundary conditions, accessible-resource model, approximation validity and failure criteria. Calculate Eq. (13) or the channel-appropriate transition probability. Publish an unscored result if the required physical quantities cannot be supplied.

Primary failure. The channel is excluded, inaccessible or negligibly suppressed across the preregistered range.

12.3 Study HRIH-C: maker-selection

Question. Does maker-selection predict held-out parameter relations beyond habitability and rival selection models?

Design. Freeze L, C, S and K proxies and the held-out split before fitting. Compare predictive log density [35] and Bayes factors [22] against life-only, black-hole-production and technology-only selection. Use negative controls and leave-one-parameter-family-out sensitivity.

Primary failure. HRIH fails to exceed the smallest meaningful predictive advantage, with the interval wholly inside the equivalence region.

12.4 Study HRIH-D: cosmogenic branching

Question. Under explicit uncertainty and dependence, what posterior mass lies above $\mu_R = 1$?

Design. Build a joint probabilistic model of the factors in Eq. (16). Report posterior distributions for each factor, dependence assumptions, extinction probability and value-of-information analysis identifying which measurements dominate uncertainty.

Primary failure. Posterior mass above one is negligible across preregistered priors and dependence structures.

12.5 Study HRIH-E: closed-cycle admissibility

Question. Does a specified theory admit a stable, non-zero-measure fixed point or periodic cosmogenic history with a distinctive observable consequence?

Design. Select one explicit physical framework. State the global state space, operator $\mathcal{C}$, boundary conditions, perturbation norm and measure. Prove or numerically establish existence and stability, then derive an observational discriminator.

Primary failure. No admissible solution, zero measure, instability, or no predictive distinction from the open-lineage model.

Registration status. These are protocol specifications, not completed registrations, until an immutable registry shows submitted or archived status. Private editable drafts do not receive preregistration language. No analysis of the target evidence may begin before the relevant protocol is frozen.

13 HRIH and the simulation hypothesis are different objects, not yet told apart

13.1 Different explanatory targets

The simulation hypothesis proposes that the experienced world is implemented on an external computational substrate. HRIH-R1 proposes that a physically real daughter cosmology is instantiated. HRIH-R3 further proposes a global closure of the cosmogenic history. Simulation can explain why an apparent world has chosen features if a simulator selected them, but ordinarily transfers the origin question to the simulator's level. Closed-cycle HRIH attempts to close that regress, at the cost of a much more demanding physical and measure-theoretic burden.

13.2 Why published simulation percentages do not settle the comparison

A probability near one half in a two-family Bayesian partition is not a measurement of the simulation hypothesis. It reflects the model partition, observer-count assumptions and priors, as Section 3.4 derives. Adding natural multiverse, real cosmogenesis and closed-cycle models changes the normalisation. Likewise, assigning HRIH a low intuitive prior and then treating broad analogy as evidence is not a Bayesian analysis. Both families must be scored through the same Eq. (9) architecture.

13.3 Physical constraint comparison

Table 2 compares the two families dimension by dimension.

Dimension	Simulation family	Real intelligent cosmogenesis
Substrate	External computing system	Parent physical universe and cosmogenic channel
Resource question	Cost and fidelity of implementing observed experience	Cost, action and accessibility of seeding a daughter state
Observer problem	Which simulated observers are in the reference class	Which observers and universe generations receive weight
Distinctive burden	Number and fidelity of simulations	Existence, control and viability of a real channel
Origin regress	Usually transferred to base reality	Open lineage transfers it; closed-cycle submodel attempts closure
Present status	Philosophically developed, physically disputed	Physically and statistically underdeveloped

Table 2. The hypotheses require different likelihoods. Neither earns probability from public familiarity or the number of articles discussing it.

13.4 A fair outcome today

Current public evidence does not justify a robust numerical posterior comparison between HRIH and simulation. The scientifically correct conclusion is not that simulation is therefore more likely, nor that HRIH is therefore overlooked. It is that HRIH requires a scored physical model and registered evidence architecture before the comparison is meaningful.

It is worth saying plainly what that absence costs, because it is easily mistaken for a stalemate. With no registered generative model on either side, no observation currently discriminates between the simulation family and real intelligent cosmogenesis: both accumulate commentary and neither accumulates likelihood, so the origin question stays unscored rather than unanswered. The cost to the field is not that it lacks an answer. It is that it holds no instrument that could tell the two answers apart, and until one exists any preference between them is a preference about priors.

14 The lineage HRIH descends from, and the exact contribution claimed

14.1 Intelligent and reproductive cosmology

HRIH belongs to a small but real lineage of cosmological proposals involving universe reproduction or intelligent participation. Smolin [30] proposed cosmological natural selection through black holes. Crane's meduso-anthropic principle [8], Harrison's intelligent-life selection proposal [18], Gardner's *Biocosm* [15], and Vidal's inquiry into whether natural or artificial selection could hold on a cosmic scale [36] discuss intelligence and universe creation in different forms. These are antecedents, not embarrassments. HRIH's defensible novelty must be stated as a precise remainder after they are credited.

14.2 Quantum cosmology and no-boundary proposals

Hartle-Hawking no-boundary cosmology [19], Vilenkin's tunnelling proposal [37], and past-eternal or null-boundary models such as Aguirre-Gratton [1] show that the absence of an ordinary initial temporal boundary is not unique to HRIH, though inflating spacetimes are past-incomplete under the bound of Borde, Guth and Vilenkin [3]. HRIH's distinctive ambition is not merely to

remove a boundary mathematically, but to model selected initial conditions through intelligent cosmogenesis and, in R3, global closure.

14.3 Anthropic reasoning and observer measures

Carter [6], Weinberg [38] and later multiverse work developed observer-selection arguments; Srednicki and Hartle [31] made explicit that a theory in a large universe requires a xerographic distribution. HRIH therefore cannot treat "we observe a life-permitting universe" as direct evidence of deliberate creation. Its maker-selection claim must predict something beyond observer permission.

14.4 Simulation

Bostrom's argument [4], Chalmers's philosophy of virtual reality [7], Kipping's Bayesian model [23] and physical critiques [34] provide a mature comparison literature. HRIH should use that literature as a methodological benchmark, not as an opponent to defeat rhetorically.

14.5 The exact contribution claimed here

This reconstruction claims authorship of a particular scientific programme that combines:

1. nested real-intelligent-cosmogenesis, lineage and closed-cycle models;
2. explicit physical-channel scoring;
3. a cosmogenic branching threshold including creator-system stability and creator choice;
4. maker-selection beyond habitability;
5. explicit observer weighting;
6. a Bayesian comparison against natural and simulation families, to be run under registration.

The priority of that exact conjunction remains subject to systematic literature review. No claim is made to have originated baby-universe physics, anthropic reasoning, simulation arguments, cosmological natural selection or artificial cosmogenesis individually.

15 Six limits on what the programme can decide

15.1 Physics is incomplete

Quantum gravity is unresolved. Semiclassical calculations may fail in the regimes most relevant to cosmogenesis. HRIH cannot bridge those gaps by naming hyperspace or by invoking future intelligence. Unknown physics can keep a possibility open; it cannot make it probable.

15.2 Priors and measures dominate

Model priors, parameter priors and observer measures can dominate cosmological posteriors; for anthropic predictions, Starkman and Trotta argue that the answer depends on how probabilities are assigned to possible universes [32]. The paper's remedy is sensitivity and registration, not a claim that one choice is uniquely correct.

15.3 One observed universe

We have one observed universe and strong selection effects. Many proposed discriminators may remain underpowered or underdetermined. Maker-selection must therefore focus on structured, held-out predictions rather than visual closeness to familiar constants.

15.4 Technological forecasting

The probability that intelligence reaches cosmogenic capability is uncertain and may be dominated by existential risk, coordination, energy, time and physical impossibility. Near-term AI progress is not direct evidence that cosmogenesis is attainable.

15.5 Normative uncertainty

p_W may be small. Advanced agents may reject real cosmogenesis for ethical or practical reasons. HRIH cannot assume that creation is inevitable merely because it is possible.

15.6 The closed loop may remain metaphysical

If R3 produces no observational distinction from an open lineage or a natural boundary model, it cannot become an empirically preferred cosmological theory even if it remains logically coherent. The paper permits that outcome.

16 Eight rungs of claim, and the neighbour each proposition degrades to

Rung	Claim	Present status	What moves it
1	Advanced agents may model or simulate cosmologies	Established in weak computational forms; not universe creation	Better simulation and theoretical work
2	A physically admissible daughter-universe channel exists	Open; serious theoretical precedents, major obstacles	HRIH-B and mature quantum gravity
3	Agents can control such a channel	Open and more demanding than existence	Parent-to-daughter parameter map
4	Agents choose real cosmogenesis	Open normative/behavioural parameter	Evidence bearing on p_W
5	Viable daughter universes result	Open	Channel physics and viability model
6	Multi-generation intelligent lineages occur	Open; conditional branching model supplied	Posterior on μ_R
7	Maker-selection shaped our constants	Unconfirmed; principal empirical target	HRIH-C held-out prediction

Rung	Claim	Present status	What moves it
8	The lineage forms a globally closed cycle	Most speculative; postulated, not derived	HRIH-E existence, stability and prediction

16.1 Which propositions are definitional and which degrade to a named neighbour

A hypothesis that must be accepted or rejected whole cannot be argued with, only believed or dismissed. The three nested propositions are therefore graded here for separability, in advance and dated. The discipline matters more than the content: a retreat published *before* an attack is a map, whereas the same retreat published after one is a concession dressed as a position.

Two commitments are definitional. Lose either and what remains is not a weakened form of this hypothesis but somebody else's, and the honest move is to say so and cite them. If the created universe is a computation rather than an instantiation, the position belongs to the simulation family, whose best-known argument is Bostrom's [4], and this paper has no separate claim. If universes reproduce with no mind involved, the position is natural cosmological reproduction, whose selection form through black holes is Smolin's [30], older, better developed, and not in need of this paper.

The remaining commitments degrade rather than die, and each degrades to something with a name. Naming the survivor is what makes this a map and not a hedge. If the cycle cannot close, what survives is a linear lineage with an unexplained first link, which is the position most cosmologies already occupy. If lineage fails but a single transition holds, what survives is one-generation intelligent cosmogenesis, the first step of the selection lineages that Crane, Harrison and Gardner propose [8, 18, 15], with the reproduction threshold added and nothing else. If maker-selection yields no enrichment beyond habitability, what survives is a feasibility question about baby universes, which is a physics problem of independent interest that this paper did not create and would not settle.

Counted honestly, a critic who defeats one of the degradable commitments has not defeated this hypothesis; they have moved it to a named neighbour, and this paper has said in advance which neighbour it would be. A critic who defeats either definitional commitment has ended it, and this paper says that too.

17 Provenance kept apart from evidence, and the corrections that cost something

17.1 Separation of provenance from evidence

The earlier HRIH materials contain a substantial priority and genesis record. That record is important for authorship and history. It is not cosmological evidence. The scientific paper therefore cites a dedicated provenance register, the programme's public priority ledger [40], rather than reproducing the full dossier in its evidential argument.

17.2 Preservation of the long-form edition

The long-form edition, at version 3.51, should remain the canonical and provenance-bearing work under its existing record. This scientific reconstruction should receive a new version identity and, if publicly deposited, a distinct DOI or clearly separate OSF component. Replacing the long-form

content in place would make the DOI resolve to a different scholarly object and blur the correction history.

17.3 Material relocated, not erased

The bodies of work taken out of the evidential argument remain valuable but carry different evidential classes. Appendix E lists each with its treatment here and its continuing home.

17.4 Corrections carried from the long-form record, which are the ones that cost something

The changes listed in the following subsection were made by this reconstruction, and a reader is entitled to notice that a paper's own list of its own improvements is cheap to write. Three earlier corrections are therefore carried here from the long-form record, because they are the three that cost the programme something at the moment they were made.

1. The exponent originally reported at approximately 2.24 was the programme's flagship number. It is retracted. Paper II [44] reports, on Gemini 3 Flash, the model it treats as its most reliable estimate, an endpoint sequential exponent of 0.59 with a bootstrap 95 per cent interval of −1.3 to 2.9, a regression sequential exponent of 0.49 with a standard error of 0.20 and a coefficient of determination of 0.86, and a compute-matched parallel exponent of 0.31. It is one model's fit and inconclusive. The interval contains both zero and two, so the correction destroyed the headline result rather than qualifying it and put no comparable number where it had stood.
2. A four-term decomposition comparing this hypothesis with the simulation hypothesis was withdrawn in place. It was the only quantitative comparison the programme could make with its best-known rival, and withdrawing it left no numerical claim against that rival in either direction.
3. Of the twelve tracked predictions, eleven stand withdrawn pending audit and the twelfth was retired on 6 September 2026 because the result it cited predates it. No immutable source fixed the asserted public date, so none could be shown to be prospective, and the forward-looking register was emptied entirely rather than trimmed.

The test a reader should apply to any programme that advertises its own retractions is not sincerity but cost. Retracting a detail while the headline survives is cheap; the three above are not, because nobody volunteers them for advantage. That is offered as evidence, not as character, and the long-form edition sets out the same test at greater length together with the conditions under which this programme would fail it.

17.5 Corrections made by this reconstruction

This reconstruction records, rather than conceals, the following changes in scientific position:

1. recursion no longer supplies a proof against a first boundary;
2. occurrence is separated from constructibility;
3. creator ability is separated from preference;
4. lower-level ARC results are assigned neutral cosmological evidence absent a bridge;
5. numerical HRIH probabilities are withheld pending registered models;
6. compatibility claims are not counted as support;

7. the closed loop is a nested, stronger submodel rather than the premise of all intelligent cosmogenesis.

17.6 Where this paper and the long-form edition differ

On the points below this paper carries a correction that the long-form edition, at version 3.51, has not yet taken up; on those points this paper's wording is the corrected one.

1. **The limit of the observer count.** Its section 12A.3 takes the complement family to make no created observers; under this paper's three families two families create, so the limit is stated for each creating family, and under equal weights the chance of having been made by either tends to two thirds (Section 3.4).

2. **Vazza's figures.** Its section 12A.4 gives 5.6×10^{59} erg as the cost of initialising a simulation of the Earth and has the bill reach the Milky Way's rest-mass energy after a handful of steps; his own figures are 2.55×10^{59} erg, for the Earth at full resolution, and about 10^6 timesteps, and 5.6×10^{59} erg is his comparison figure for Palomar 2.

3. **The source of the derivative.** Its section 12A.4 credits the whole duration derivative to Vazza's per-timestep result; only the derivative's first half is his, and its second half is this paper's premise (Section 5.6).

4. **The resource standing of instantiation.** Its section 12A.4 calls this paper's mechanism unobstructed on resources; this paper claims only that no bill grows with the child's duration, and its one-off cost is not yet calculated.

5. **The two obstacles.** Its section 12A.4 places a hypothesis blocked by an open question in a better epistemic position than one blocked by a closed sum; this paper claims a difference in kind and no better position.

6. **The reach of the derivative.** Its section 12A.4 says that an impossibility-class result against simulation says nothing whatever about instantiation; here the derivative answers resource-budget results only, and the undecidability result, which the long-form edition also answers on its own ground, is answered separately.

7. **The reproduction number.** Its section 12A.10 defines m_R as the expected viable daughters given success, which beside p_V counts viability twice; here m_R counts the daughters generated (Eq. (16)), as the reference code does.

8. **The argument from the initial order.** Its section 12A.5 calls the sign of the ratio a consequence of the containment relation that is not model-dependent, has raising require a global thermodynamic gradient sustained across cosmic time, and has its K2 collapse the containment relation; here the sign rests also on the premise that raising needs more initial order than observing, which E2 would defeat, and raising needs a gradient only for as long as raising takes (Section 7.5).

9. **Penrose's resolution.** Its section 12A.5 names conformal cyclic cosmology as Penrose's resolution and calls maker-selection the second hypothesis his argument has lacked; in the 1979 chapter from which this paper quotes his argument, his resolution, and so his own second hypothesis, is the initial vanishing of the Weyl curvature, which conformal cyclic cosmology later carried, and this paper names both and calls maker-selection a second selection hypothesis.

10. **The laws' place in the hypothesis.** Its section 1D says that if Law I fails "the capability premise beneath the whole construction goes, and HRIH goes with it", and calls the dependence on Law II "the most load-bearing single dependency"; here none of the five laws is a premise of

HRIH, and a law's failure takes away at most the creator-stability model it informs (Section 9), as the statement paper, at version 7.3, holds of HRIH: "no outcome of any register is evidence for or against it".

11. **The two definitional concessions.** Its section 15.1, on which of its seven claims can be lost, gives the computation case to Bostrom and the no-mind case to Smolin; Bostrom argues a trilemma rather than that our universe is a computation, and Smolin proposes one mechanism with no mind involved, so this paper gives the two cases to the simulation family and to natural cosmological reproduction and cites Bostrom's argument and Smolin's selection through black holes as the best-known form of each (Section 16.1).

The long-form edition also counts all twelve tracked predictions as withdrawn pending audit; Section 17.4 gives the register as it stands at the date of this paper.

18 What survives, and the work ahead

HRIH is not established cosmology. It does not presently show that intelligence created our universe, that the Big Bang was engineered, or that a beginningless intelligent loop is physically real. Its central intuition nevertheless survives in a scientifically stronger form.

A physically real daughter-universe channel is a legitimate question at the frontier of gravitation and quantum cosmology. If intelligence can access such a channel, cosmogenic histories can be represented as branching processes. If creator-enabling properties affect the distribution of daughter constants, maker-selection can in principle be compared with life-only and natural reproductive selection. If a specified global theory admits a stable fixed point or cycle, the Big Bang can become an internal boundary of a self-consistent history rather than an unexplained first event in a linear chain.

The work ahead is explicit: choose one physical channel; freeze a fair model space; specify observer measures; compute branching survival; define maker-selection factors independently; and permit every central claim to lose. The most defensible HRIH is therefore not a declaration that the origin problem has been solved. It is a Bayesian and physical research programme whose strongest submodel supplies a candidate solution and whose lower rungs can be tested separately.

HRIH earns evidence not when its narrative can accommodate the universe, but when its registered generative models predict observations that its strongest rivals did not.

A Notation and minimum data schema

Symbol	Definition
X_g	Universe-history state in generation g
A_g	Cosmogenic agent/civilisation state
θ	Laws, constants and boundary parameters
χ	Physical cosmogenesis channel
$\mathcal{T}_\chi$	Parent-to-daughter transition kernel
$\mathcal{C}$	Complete-history operator used in the closed-cycle submodel
$L(\theta)$	Observer/life permission factor
$C(\theta)$	Cosmogenic-accessibility factor

Symbol	Definition
$S(\theta)$	Stable technological-ascent factor
$K(\theta)$	Viable daughter-yield factor
p_W	Choice probability for physically real cosmogenesis
μ_R	Expected number of viable daughter universes per universe history
$\xi(o)$	Xerographic or observer-weighting distribution
π_j	Prior probability of model family H_j

A minimum machine-readable record for each physical submodel should contain:

```
model_id, family, channel, state_space, dynamics_or_action,
boundary_conditions, parameter_priors, accessibility_model,
observer_measure, evidence_ids, likelihood_code_hash,
prior_predictive_status, posterior_predictive_status,
kill_condition, registration_id, version, sha256
```

B Reference implementation

The reference file `hrih_bayesian_model.py`, to be deposited with this paper, implements:

- finite-model Bayesian updating from supplied priors and relative marginal likelihoods;
- the Poisson branching extinction probability;
- the cosmogenic reproduction number in Eq. (16);
- observer-weighted created-observer probabilities and a two-model posterior sensitivity grid over priors and Bayes factors;
- basic validation and self-tests.

It contains no empirical posterior, no hidden prior and no cosmological dataset. It does not implement the maker-selection weighting of Eq. (24), which awaits the frozen C, S and K proxies of Study HRIH-C. Its purpose is to make the conditional arithmetic inspectable and to prevent prose from drifting away from equations.

C Skeleton of an analysis for registration

A registered model-space analysis should commit to the following sequence:

1. hash and freeze every dataset and code file;
2. publish model and submodel definitions;
3. publish priors and observer measures;
4. run prior-predictive checks only;
5. freeze exclusions and evidence-cluster dependence;
6. submit/archival-freeze the registration;
7. compute marginal likelihoods;
8. run predeclared sensitivity analyses;

9. report all models, including those driven near zero;
10. publish unchanged machine output before narrative interpretation.

D Illustrative sensitivity, not evidence

Suppose three top-level models receive priors π_{N}, π_{S}, π_{R} and an evidence cluster supplies marginal likelihoods Z_{N}, Z_{S}, Z_{R}. The posterior odds for HRIH against natural cosmology are

$$\frac{P(H_{\mathrm{R}} \mid D)}{P(H_{\mathrm{N}} \mid D)} = \frac{\pi_{\mathrm{R}}}{\pi_{\mathrm{N}}} \frac{Z_{\mathrm{R}}}{Z_{\mathrm{N}}}. \tag{28}$$

This identity shows why no amount of prose can supply a posterior. Both prior odds and a likelihood ratio are required. If the evidence is equally expected under the models, $Z_{\mathrm{R}}/Z_{\mathrm{N}} = 1$ and the posterior odds remain the prior odds. This is the appropriate treatment of broad ARC correspondences today.

E Version transition from the long-form edition

Long-form material	Scientific-reconstruction treatment	Continuing home
Closed causal loop	Retained as nested R3; fixed-point formalism; no derivation from recursion	This paper
Intelligent cosmogenesis	Retained as R1 with channel-specific feasibility	This paper
Recursive universe lineage	Retained as R2 branching model	This paper
Fine-tuning narrative	Replaced by a maker-selection likelihood to be registered	This paper
Priority dossier	Removed from evidential argument, preserved and cited	Provenance register
Religious convergence	Preserved, labelled interpretive/non-evidential	Companion essay
Personal genesis narrative	Preserved as first-person provenance	Book/essay
Eden governance	Preserved and separated from cosmological evidence	ARC/Eden ethics paper
Future ladder	Preserved, labelled forecast/non-evidential	Forecast register
Cross-domain compatibility	Retained only as compatibility, never support	Companion/reference pages
Numerical HRIH probability	Withdrawn unless generated by registered model	HRIH-A future result

Where the third column names a home that does not yet exist, the material's home today is the long-form edition, where it is preserved as dated work.

F Authorial and scientific status statement

The paper is authored by Michael Darius Eastwood as an independent researcher. It is a working paper under the open review listed on page 2, not a confirmation of the hypothesis. The author claims responsibility for the specific programme stated here and credits the antecedent literature for its components. Scientific standing depends on physical and statistical tests run under registration, not on the date, branding, scale of the website or the author's biography.

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Provenance note. Michael Darius Eastwood conceived and directs this research programme and is the author of this work. Across the programme, he has used more than six AI systems in parallel, under his own instructions, to stress-test his arguments, identify possible errors, and assist in preparing draft text from his own outlines. He determines what is adopted, revised or rejected and takes responsibility for the published content. These systems are tools, not authors.