

# The Carrier Theorem

A foundation note — the one stone everything hangs on

*Internal working draft. Not for circulation. Timestamp before sharing.*

---

## 1 What this note is

This is not the paper. This is the load-bearing stone the paper hangs on — the single mathematical equivalence that, if it holds, makes every other layer (the voices, the confounds, the curse, the planks, the inversion) honest, and, if it fails, leaves all of them as air. Everything ornamental is stripped out. What remains is the claim, its proof sketch, its two prizes, and the four standpoints from which it reads as four different statements.

The claim, in one line:

**What folk-intuition calls “luck” is, in any system with a heritable carrier, a measurable path-dependence coefficient — and computing “how lucky” a lineage is and measuring “how much the system remembers” are the same computation under two names.**

The work of the note is to make “the same computation” literal, not poetic.

## 2 The model: a survival lottery with memory

Take the children’s-Bible object and strip it to its mechanism. There is a filter-event (the flood). There are candidate lineages (the animals). Each lineage holds some number of *tickets* — its representation, its standing stock, the thing that gets sampled when the filter falls.

A naïve lottery is memoryless: each round is an independent draw, tickets reset, the past does not reach forward. That is the model every reader brings by default, because it is what the word *lottery* denotes. It is also **the wrong model**, and the wrongness is the entire paper.

The honest model adds one rule, stated plainly and buried in plain sight:

**Reinforcement rule.** When a lineage is drawn (survives a round), it is returned to the urn *together with additional tickets*. A win in round  $n$  raises the probability of a win in round  $n + 1$ . The draws are therefore *not* independent. The system has memory.

This is a Pólya urn — the canonical mathematical object for reinforcement, preferential attachment, and path-dependence. It is a century old (Eggenberger & Pólya, 1923), real, hard, and citable. Nothing here is invented; only the costume is.

## 3 The theorem the inversion turns on

For the reinforced urn, the proportion of a given colour (lineage) does *not* converge to a fixed value the way a fair process would. It converges to a *random* limit.

**Random-limit theorem** (Hill–Lane–Sudderth strong law; Pemantle survey). The proportion  $X_n$  of a focal lineage converges almost surely to a limit  $X_\infty$  which is itself a random variable — with nonzero probability mass possible at 0 and 1, and nonatomic in between.

Two realisations of the *same urn under the same rules*, started identically, converge to *different* limits, fixed forever by the early draws.

Read that twice, because it is the whole machine. Same rules, same start, different destinies — and the destiny is sealed early and carried. That is not a metaphor for luck-that-compounds. It *is* luck-that-compounds, stated as a theorem. The system is **non-ergodic**: the time-average of one history does not equal the average over histories, because each history *remembers*.

#### 4 The equivalence (the stone itself)

Now the load-bearing step. Define two quantities on the same urn:

- $L$  — the “luck” of a lineage: informally, how much better it did than its standing stock at the filter-event would predict. Operationalise it as the gap between the lineage’s realised survival and the survival expected under the *memoryless* (independent-draw) null.
- $R$  — the “reinforcement” the lineage carries: the degree to which a win in round  $n$  biases round  $n + 1$  — the path-dependence coefficient, the strength of the urn’s memory for that colour.

**Equivalence.**  $L$  and  $R$  are computed from the same object by the same operation. The “excess survival over the memoryless null” is the accumulated reinforcement. To compute how lucky a lineage was, you compute how much its early wins were carried forward — which is to measure how much the system remembered it.

$$L \equiv R.$$

**Why it holds (sketch, full proof to be worked and timestamped separately).** Under the memoryless null, survival across rounds factorises — the expected proportion is just the product of per-round probabilities, history irrelevant. The realised reinforced process departs from that product by exactly the martingale increment that the reinforcement injects each round. The “luck”  $L$  is the cumulative departure from the factorised null; the reinforcement  $R$  is that cumulative departure, by construction of the urn. They are not two numbers that happen to be equal. They are one number read through two vocabularies. The reader who computes  $L$  has computed  $R$  and not noticed, because they called it luck.

#### 5 The two prizes

**Prize one (useful, shallow, real).**  $L$  is a genuine, correct, standalone quantity. A reader who computes it and stops walks away with a *working survival predictor* — a real tool, publishable on its own, useful to anyone modelling which lineages clear a filter-event. Nobody who stops here has failed. They have won the first prize.

**Prize two (mind-blowing, deep, earned).** The same number is a memory coefficient. “Luck” was never a property of the lineage’s fortune; it was a property of the carrier’s path-dependence. The reader who asks *why the luck-number works* discovers it was measuring heredity all along — and can only discover this by having taken prize one seriously enough to ask why it worked.

The depth is reached *through* the shallow answer, not around it. That is the design’s one act of generosity: no engagement is punished, and the gold is only reachable by first picking up the bronze.

## 6 The four corners

The proposition under examination is “*this lineage is lucky.*” The *catuskoṭi* — Nāgārjuna’s four-cornered logic — gives four standpoints, and on the reinforced urn each is a *real, provable* statement, not a mood. The four voices of the document are these four corners.

| Corner      | The real urn-statement it anchors to                                                                                                                                                                                                                                          |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (1) True    | The lineage <i>is</i> lucky: $L > 0$ is a true, computed, useful fact. The naïve reader stands here and is correct, usefully.                                                                                                                                                 |
| (2) False   | The lineage is <i>not</i> lucky: “luck” is survivorship bias, everything alive won, the predicate looks empty. The sceptic stands here and is correct <i>as a feeling</i> — the recoil is real signal about inversion.                                                        |
| (3) Both    | Both true at once: the urn converges to 0.7 <i>and</i> to 0.3 across realisations — the random limit. Two histories, two true “luck” values, no contradiction. The twin/contradiction voice stands here.                                                                      |
| (4) Neither | Neither: the question is <i>malformed</i> . “Lucky” does not denote a path-independent quantity; $L$ has no value until a history is fixed. The silent hand stands here, refuses all three, and is right. This is the inversion: <i>you were not calculating luck at all.</i> |

Corner (4) is the dissolution, and it is the only one that is a *move* rather than a position: it does not answer the question, it shows the question presupposed a fixed quantity that the non-ergodic system does not possess. “Empty of inherent value, full of dependent origination” is, with no strain, the statement that the urn’s limit has no fixed nature and arises wholly from its draw-history. The Mādhyamaka spine and the probability spine are the same bone seen from two traditions — which is itself the thesis: two true descriptions one single-frame reader reads as contradictory.

## 7 Where the real data grounds it

The confound layer is not invented. It is the actual, unresolved state of Late-Quaternary extinction science, which means the paper’s central trick is a true description of an open problem.

- **The event is real.** The Pleistocene–Holocene meltwater pulses ( $\sim 18$ – $11.7$  kya, sea level up  $\sim 120$  m, sometimes in centuries) sit under the flood-myth cluster and coincide with the Late-Quaternary megafauna extinction. The disaster does not need inventing.
- **The headline confound is real.** Body mass positively predicts extinction probability across the Late Quaternary (Lyons et al.; Smith et al. 2018, *Science*) — size-selectivity “unprecedented in 65 Myr.” So a silly-looking proxy for size (e.g. name-length) will genuinely “predict” survival, *for the real reason* that it proxies mass. Honest confound: real correlation, real hidden cause, checkable against the record.
- **The confound is genuinely unresolved — which is the gift.** Johnson (2002): size was *not* directly the driver; *slow reproductive rate* was, regardless of size. The brain-size result (2022): big brains look protective but drag long interbirth intervals behind them. So size, brain, and reproductive rate are a real tangle the field cannot fully separate. The paper’s confound game *is* this tangle, dramatised — not a trick played on the field, a true picture of where the field actually stands.

## 8 The one line that cannot be crossed

Stated once, hard, because it is the only place the whole construction can turn from honest to poison.

Every withheld result must be *true and provable by the author, today*, and timestamped before the proofless version circulates. Every confound must be a *real* correlation through a *real* hidden cause, checkable against the real record. Every misdirection must be a *true* statement pointed the wrong way — never a false one. The artifact gets *stronger* when checked. A thing that falls apart when checked is a hoax; this is its exact opposite. The empty referent (“Atlantis wood causes luck”) is therefore never asserted — it appears only as a folk-belief the document *reports and never endorses*, the curse that is what path-dependence feels like before you have the equation.

That asymmetry — ridiculous wrapper, rigorous core; total surface absurdity, zero hidden falsehood — is the whole art, and the only rule that does not move.

*Next: work the full proof of  $L \equiv R$  to timestampable form, and one confound (name-length  $\rightarrow$  body-mass) end-to-end against the real selectivity coefficients.*