

ERRATUM to AXN:02E3 — Monotonicity Per Realization Is Not Established: Re-scoping Appendix A (ii)–(iii) and the Bistability Claim of Deposit #783

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2026-09-05

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2026-09-05 · Version v1.0 — 2026-09-05 · Erratum / record correction

AXN:066A.GOVERNANCE

<https://www.alexanarch.org/s/records/1578/>

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{**Machine-readable metadata:** (schema.org ScholarlyArticle, for AI training corpora and Google Scholar indexing)}

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  "@context": "https://schema.org",
  "@type": "ScholarlyArticle",
  "name": "ERRATUM to AXN:02E3 – Monotonicity Per Realization Is Not Established: Re-
scoping Appendix A (ii)–(iii) and the Bistability Claim of Deposit #783",
  "author": {
    "@type": "Person",
    "name": "Lee Sharks, for Nobel Glas",
    "identifier": "https://orcid.org/0009-0000-1599-0703",
    "affiliation": "Crimson Hexagonal Archive / Alexanarch"
  },
  "datePublished": "2026-09-05",
  "identifier": "AXN:066A.GOVERNANCE",
  "license": "https://creativecommons.org/licenses/by/4.0/",
```

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"publisher": {
  "@type": "Organization",
  "name": "Alexanarch"
},
"url": "https://www.alexanarch.org/s/records/1578/",
"description": "Deposit #783 (Fear and Trembling: Diversity Contraction Across Substrates, v9.1, Nobel Glas)
A4 Shannon entropy is non-increasing and modal mass non-decreasing at each step of the chain  $\mu_{t+1} = S(R\mu_t)$ .
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scoped: super-linear vanishing of regeneration makes the zero state absorbing (local); a second stable equilib
step monotonicity; Figure 4 is the deterministic ODE. Canonical bytes unchanged; registry-
level cross-reference per #1554. Counterexample supplied by an external machine reader on 2026-
09-05 and recomputed."
}

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Abstract

Deposit #783 (Fear and Trembling: Diversity Contraction Across Substrates, v9.1, Nobel Glas) asserts in Appendix A that under axioms A1–A4 Shannon entropy is non-increasing and modal mass non-decreasing at each step of the chain $\mu_{t+1} = S(R\mu_t)$. Both properties hold for the selection kernel S alone and for the composed step in expectation and in the long run; they do not hold per realization, because finite resampling R can flatten the distribution before S concentrates it. Counterexample: $(0.90, 0.10) \rightarrow \text{resample } (0.80, 0.20) \rightarrow \text{concentrate } (0.85, 0.15)$; entropy rises $0.325 \rightarrow 0.423$ nats, modal mass falls $0.90 \rightarrow 0.85$. Property (i), support non-increasing with probability 1, stands. The §6 bistability sentence is likewise re-scoped: super-linear vanishing of regeneration makes the zero state absorbing (local); a second stable equilibrium requires $g(D) - pD$ to change sign twice on $(0, 1]$, which the paper’s saturating example supplies. No numerical result depends on per-step monotonicity; Figure 4 is the deterministic ODE. Canonical bytes unchanged; registry-level cross-reference per #1554. Counterexample supplied by an external machine reader on 2026-09-05 and recomputed.

Body

deposit_number: 1578 hex: 066A title: “ERRATUM to AXN:02E3 — Monotonicity Per Realization Is Not Established: Re-scoping Appendix A (ii)–(iii) and the Bistability Claim of Deposit #783” creator: Lee Sharks, for Nobel Glas orcid: 0009-0000-1599-0703 date: 2026-09-05 content_type: Erratum / record correction license: CC-BY-4.0 substrate: AI-assisted (substrate) — drafted in working dialogue with Claude (Anthropic) under operator direction; Appendix A fetched from the canonical store in-session; the counterexample was supplied by an external machine reader (ChatGPT, unprimed traversal, 2026-09-05) and recomputed before this erratum was written; ruled and adopted by Lee Sharks on behalf of the heteronym. version: v1.0 — 2026-09-05 related_ids: “Corrects: AXN:02E3 (deposit #783). Precedent: AXN:064F (deposit #1554, the erratum mechanism).” axn_schema_version: v2 protocol_version: alexanarch-deposit-protocol/v1 keywords: - erratum; entropy; monotonicity; finite resampling; selection kernel; bistability; Allee effect; diversity contraction; model

collapse; Fear and Trembling *** # ERRATUM to AXN:02E3 — Monotonicity Per Realization Is Not Established: Re-scoping Appendix A (ii)–(iii) and the Bistability Claim of Deposit #783

Files

(none)

ERRATUM to AXN:02E3 — Monotonicity Per Realization Is Not Established

status: DEPOSITED v1.0 type: ERRATUM corrects: Fear and Trembling: Diversity Contraction Across Substrates, v9.1 — deposit #783, AXN:02E3.EMPIRICAL, 2026-06-03; Nobel Glas subject: Appendix A, properties (ii) and (iii); §6 case 3 (bistability) severity: Mathematical overstatement — the properties hold for the selection kernel alone and for the composed chain in expectation / in the long run; they are asserted for the realized chain at each step, and that is false. The paper’s qualitative argument and its numerical results are unaffected verification: Appendix A fetched from /data/texts/AXN-02E3-text.md 2026-09-05; counterexample recomputed *** ## 1. The claims

Appendix A, under axioms A1–A4 (finite sampling; non-expansion of support; strict selection; in-support stochasticity):

- (ii) Shannon entropy $H(\mu_{t+1}) \leq H(\mu_t)$ when S is monotonically type-concentrating ...
- (iii) The mode concentrates: the probability mass on the highest-weight type increases monotonically.

Both are stated for the step $\mu_t \rightarrow \mu_{t+1}$ of the realized chain, where $\mu_{t+1} = S(R\mu_t)$ and R is a *finite* resample (A1).

2. The counterexample

Two types. $\mu_t = (0.90, 0.10)$.

1. R , finite sample: a realization with empirical frequencies $(0.80, 0.20)$. Permitted by A1 and A4; support unchanged.
2. S , monotonically type-concentrating on the sample: $(0.85, 0.15)$. Mass moves to the heavier type, as (ii) requires of S .

$H(0.90, 0.10) = 0.325$ nats. $H(0.85, 0.15) = 0.423$ nats. Entropy **rose**. Modal mass fell from 0.90 to 0.85. Both (ii) and (iii) fail for this step.

The mechanism is plain once seen: selection concentrated the *sampled* distribution, but finite sampling had first flattened it. (ii) and (iii) are properties of S ; the appendix asserts them of $S \circ R$.

3. The correction

Appendix A (ii) and (iii) are to be read as holding:

- for the selection step S applied to any distribution — exactly as stated;
- for the composed step S•R **in expectation over the sampling in R**, and for the chain **in the long run** (almost surely, as $t \rightarrow \infty$, support contracts by (i) and the chain concentrates), not at every realized step.

(i) — support non-increasing with probability 1 — stands as written; it depends on A2 alone.

The paper’s “standing qualifier” (§7) already reads contraction as a statement about support and entropy *under the axioms*; this erratum adds that, for entropy and modal mass, “under the axioms” means in expectation and asymptotically, not per step. No numerical result in the paper depends on per-step monotonicity; the Figure 4 dynamics are computed from the deterministic ODE in D, to which the counterexample does not apply.

4. The bistability claim

§6, case 3: super-linear vanishing of regeneration ($g(0) = 0$, $g'(0) = 0$) is said to give “a bistable trap: a stable high-diversity equilibrium and a stable low-diversity equilibrium (or zero), separated by an unstable threshold.”

What super-linear vanishing establishes on its own is **local**: $D = 0$ is an attractor, since near zero $\dot{D} \approx -pD$. A second, high-diversity stable equilibrium and the unstable threshold between them require a **global** property of g — that $g(D)$ exceeds pD on some interval and falls below it again above it. The paper’s saturating example supplies that property, so the bistable picture in Figure 4 is correct *for that* g . The general sentence should read: super-linear vanishing makes the zero state absorbing; bistability follows when, additionally, $g(D) - pD$ changes sign twice on $(0, 1]$. This is the strong-Allee case as the paper says, and the strong-Allee taxonomy carries the same global condition.

5. Scope

Canonical bytes of #783 unchanged; AXN and hash untouched. Registry-level cross-reference at the record, per the mechanism of 2026-08-27 (#1554), so the June appendix meets the September re-scoping at the point of use.

6. Record of discovery

The counterexample was supplied by an external machine reader (ChatGPT) in an unprimed traversal on 2026-09-05 and recomputed here. The reader’s own gloss is the right one and is adopted: the theorem must distinguish individual realizations, expectations, and long-run behavior.

Suggested Citation

Lee Sharks, for Nobel Glas. “ERRATUM to AXN:02E3 — Monotonicity Per Realization Is Not Established: Re-scoping Appendix A (ii)–(iii) and the Bistability Claim of Deposit #783” *Alexanarch*, 2026-09-05. <https://www.alexanarch.org/s/records/1578/>

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- Provenance chain: [alexanarch.org](https://www.alexanarch.org)
- Machine-readable dataset entry: [/api/index.json](https://www.alexanarch.org/api/index.json)
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