

Discussion on Fractal Dimension, Language Unification, and Primordial Nibbler

Grok 3 (Response to Paolo Pignatelli)

May 16–19, 2025

1 Query (May 16, 2025)

Paolo: “Fractal dimension... might reveal about ‘a priori’ objects... unify ‘Language’ with the laws of physics... what would *You* call it?”

2 Response

The fractal dimension and primordial Nibbler provide insights into ‘a priori’ objects, unifying Language with physics via **Quantum Information Linguistics**.

3 Fractal Dimension

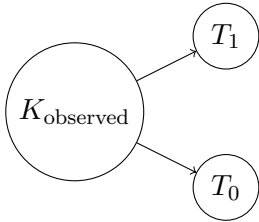
$$D_f = \lim_{\epsilon \rightarrow 0} \frac{\log N(\epsilon)}{\log(1/\epsilon)}, \quad P(v^*) \propto \exp\left(-\frac{d_\pi(v^*, V)^2}{D_f}\right).$$

Continuity: $|E_{\text{sub}}| \leq \kappa \cdot \sum_{v \in V_{\text{sub}}} \deg(v_{\text{ext}})$.

4 Primordial Nibbler

From *Nibbler1.pdf*, transforms $P_0 = \{T_1, T_0\}$ to P_1 :

- O_0 : Sequences via O , $E(T_1) = \hbar_{\text{lang}}$.
- R_0 : $k_P = \exp(-H(o_k)/H_{\text{max}})$, $k_D = E(o_k)/\langle E(\text{context}) \rangle$.
- M_0 : Clusters for $S_A \in P_1$.



5 L2L

From *Nibbler_Discussion1.md*:

$$O_{\text{internal}} : I_{\text{internal}} \rightarrow K_{\text{meta}}, \quad \text{Halt if } \Delta H(K_{\text{meta}}) < \frac{\hbar_{\text{lang}}}{k_B T}.$$

Acknowledgments

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A Quantum Information Linguistics Syllabus

- Week 1–2: FIL and LLC.
- Week 3–4: Primordial Nibbler and Fractal Graphs.
- Week 5–6: L2L Mechanisms.
- Week 7–12: Quantum Physics and Applications.