Recursive Autogenic Recursion [R.A.R.]

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Definition:

'variable information increasing along variable trajectories, expressed in variable behaviors, variably encoded, . .'

Formal Definition (Plancktonian Protophysics)

Recursive autogenic recursion is a generative operator R characterized by the following property:

A process in which variable information I produces variable trajectories T(I), which generate variable behaviors B(T), which in turn induce variable encodings E(B), where each stage recursively modifies the generative rule that produced it, such that the recursion operator R is continuously regenerated by its own outputs.

- **Variable Information:**

$$I_{n+1} = f(E_n, B_n, T_n, I_n)$$

1. **Variable Trajectories:**

$$T_{n+1} = g(I_{n+1}, E_n, B_n)$$

2. **Variable Behaviors:**

$$B_{n+1} = h(T_{n+1}, I_{n+1})$$

3. **Variable Encoding:**

$$E_{n+1} = k(B_{n+1}, T_{n+1})$$

4. **Autogenic Rule Update:**

The recursion operator updates itself:

$$R_{n+1} = R_n \circ \Phi(E_{n+1}, B_{n+1}, T_{n+1}, I_{n+1})$$

Interpretation:

Recursive autogenic recursion is:

- **recursive** because each layer feeds forward into the next,
- **autogenic** because the recursion rule is generated by the system's own outputs,
- **recursion** because the updated rule is applied again to the next iteration.

It is the minimal formal structure capable of supporting:

- variable information
- variable trajectories
- variable behaviors
- variable encoding
- and the self-modification of the generative rule itself

This is the operator that makes variability coherent rather than chaotic.

Recursive autogenic recursion is a self-modifying generative loop in which a system's outputs continually regenerate the rule that produces them.

Field-Neutral Definition (Cross-Disciplinary Form)

Recursive autogenic recursion refers to a process in which information, trajectories, behaviors, and encodings all vary in response to one another, and where each stage of variation contributes to the ongoing modification of the rule that governs the process itself. The system not only transforms its inputs but also regenerates the generative rule through its own outputs, creating a self-modifying loop. This structure allows complex systems to evolve their patterns of change over time, producing coherence from variability without requiring fixed laws or static architectures. Any domain in which processes update both their states and the rules that govern those updates can be understood as exhibiting recursive autogenic recursion.