# 1 Environment as Configuration

*Through the Lens of Observer-Dependent Theory of Everything (ODTOE)*

“The environment is not a separate object, but a mode of organization of accumulated results. It is not an entity. It is a configuration.”

## 1.1 Mathematical Formalization through ODTOE

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## 1.2 1. CENTRAL THESIS

Environment is a fundamental category requiring precise definition:

**Environment ≠ simply sum of results.**

**Environment = structured system of mutual action of these results.**

And further — definition:

> *Environment is not a separate object, but a mode of organization of accumulated results. It is not an entity. It is a configuration.*

In reducing environment to “sum of results” five properties are lost:

- **Inertia** — environmental resistance to changes
- **Density** — saturation of environment with interactions
- **Selective Pressure** — environment’s ability to select compatible elements
- **Self-Replication** — environment’s ability to reproduce itself
- **Second Order** — environment’s ability to generate new environments

Each of these statements is direct consequence of ODTOE mathematical apparatus.

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## 1.3 2. ENVIRONMENT = CONFIGURATION: CORRESPONDENCE WITH ODTOE

### 1.3.1 2.1. “It is not an entity. It is a configuration.”

This statement has precise formal equivalent in ODTOE.

In section 4.1 of theory, configuration space $\mathbb{C}$ is defined — complete metric space of all possible states of reality:

$$\mathbb{C} = \{c_1, c_2, \ldots\}, \quad d : \mathbb{C} \times \mathbb{C} \to \mathbb{R}^+ \qquad \text{(formula 4.1)}$$

Space $\mathbb{C}$ plays role of formal substrate — set of potential configurations, none of which is "actual" until act of observation.

Correspondence:

| Environment Thesis | ODTOE Formalization |
|---|---|
| Environment is not entity | Configuration $C \in \mathbb{C}$ has no ontological status until act of observation |
| Environment is configuration | Environment = point $C$ in space $\mathbb{C}$, realized by operator $\hat{O}$ |
| Environment derived from processes | $R = \hat{O}(\Psi)$ — reality generated by act of observation (Axiom A) |
| Environment ≠ sum of results | $\mathbb{C}$ has metric $d$ and structure — topological space |
| Environment = mode of organization | $C$ determined by potential $U(C)$ and dynamics $dC/dt$ (eq. 4.4) |

Statement "environment is configuration" coincides with ontology of ODTOE, where reality $R$ is configuration $C \in \mathbb{C}$ generated by collective observation.

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## 1.4 3. FIVE PROPERTIES OF ENVIRONMENT: DERIVATION FROM ODTOE

Reduction of environment to "sum of results" loses five properties. Each is formal consequence of ODTOE.

### 1.4.1 3.1. INERTIA

**Inertia — environmental resistance to changes**

ODTOE introduces inertia of configuration $I(C)$ as central quantity (Postulate P2):

$$I(C) = \sum w_j \cdot B_j(C) \qquad \text{(formula P2.2)}$$

Inertia is total cognitive coherence (belief) of all observers "invested" in current configuration. More people believe in current reality state, harder to change it.

Reconfiguration speed inversely proportional to inertia:

$$v(C \to C') = \frac{\alpha}{I(C)} \qquad \text{(formula P2.1)}$$

Environment with high $I(C)$ resists changes: reconfiguration requires overcoming collective belief of observers in current state.

**Environmental inertia is not metaphor, but measurable quantity, proportional to sum $\sum w_j \cdot B_j$.**

### 1.4.2 3.2. DENSITY

**Density — saturation of environment with interactions**

In ODTOE environmental density determined by two factors:

**(a) Number of observers $N(t)$:** by Postulate P1, multiverse cardinality $|M| = K^{N(t)}$. More observers interact in environment, "denser" configuration space.

**(b) Coherence level $S$:** by formula 4.5:

$$S = 1 - \frac{2}{n(n-1)} \sum |B_i - B_j|$$

High $S$ with large $n$ means group of observers tightly connected — their "beliefs" are close.

**Environmental density in ODTOE terms:**

$$\text{Density} = N(t) \times S$$

Product of observer count by coherence. Environment of 1000 coherent observers "denser" than 10,000 desynchronized.

In dynamics equation (4.4):

$$\frac{dC}{dt} = -\frac{\alpha}{I(C)} \cdot \nabla U(C) + \eta(t)$$

density determines steepness of potential $\nabla U(C)$ — denser environment "attracts" observers more strongly to specific configuration.

### 1.4.3 3.3. SELECTIVE PRESSURE

**Selective Pressure — environment's ability to select compatible elements**

In ODTOE selective pressure formalized through collective observation mechanism (Postulate P5):

$$P_{\text{coll}}(E) = 1 - \prod (1 - B_i^k) \qquad \text{(formula P5.1)}$$

Observer with $B_i$ incompatible with general configuration ($B_i \approx 0$ regarding current $R$) contributes factor $(1 - 0^k) = 1$ to product — environment "does not notice" them.

Observer with high $B_i$ compatible with configuration contributes factor $(1 - B_i^k) < 1$, strengthening $P_{\text{coll}}$. Environment "pulls them in."

Selective pressure operates automatically: environment amplifies coherent observers and weakens incoherent ones not through conscious selection but through structure of collective probability itself.

Second mechanism — belief dynamics (D1.3). Observer whose expectations diverge from collective reality (sgn $= -1$) loses $B$ over time. Environment "washes out" incompatible observers through negative feedback.

### 1.4.4 3.4. SELF-REPLICATION

**Self-Replication — environment's ability to reproduce itself**

In ODTOE self-replication follows from feedback between $R$ and $B$ (section 4.5 of theory):

- By axiom (A): $R = \hat{O}(\Psi)$ — reality determined through $B$ (through observation operator)
- By equation (D1.3): $\frac{dB}{dt} = \gamma \cdot \text{sgn} \cdot d \cdot B(1-B)$ — belief determined through $R$ (observed reality)

Self-consistent system: $R \to B \to R \to B \to \ldots$

Observer sees configuration $R$ — their $B_i$ adjusts (sgn $= +1$ when matching expectation). Adjusted $B_i$ reinforces same configuration $R$. Environment reproduces itself through "reality $\leftrightarrow$ belief" loop.

Nonlinear system $\frac{dB}{dt} = G(B, R(B))$, where $R(B) = F[\hat{O}(B), S(B), I]$, generates **attractors** — stable configurations toward which environment returns after perturbations. Self-replication is attractor pull.

Logistic multiplier $B(1 - B)$ in equation D1.3 makes $B = 0$ and $B = 1$ **absorbing states**. Environment with $B \approx 1$ for all participants "locks up": continuously reproduces itself, and exit is impossible without external intervention.

### 1.4.5 3.5. SECOND ORDER

**Second Order — environment's ability to generate new environments**

Property corresponds to Statement 3 of ODTOE (self-reference of theory):

> *ODTOE contains itself as special case — it serves as one of $N_{theories}$ theories of everything and simultaneously describes conditions of its own existence.*

Environment is configuration $C \in \mathbb{C}$. "Second-order environment" is configuration containing operators creating new configurations. Meta-configuration $C^*$:

$$C^* = \{C_1, C_2, \ldots, C_n, \hat{O}^*\}$$

where $\hat{O}^*$ is operator generating new configurations from $\Psi$.

Meta-environment (type 9 in classification of environments) — practical embodiment of this principle. By Postulate P6:

$$N_{\text{theories}}(t, S) = N_0(t) \cdot (1 - S)^m + 1$$

Second-order environment manages the parameter $S$ itself, determining number of coexisting configurations. **Meta-environment not merely exists in $\mathbb{C}$ — it projects new regions of $\mathbb{C}$.**

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## 1.5 4. CONFIGURATION vs. ENTITY: WHY THIS DISTINCTION IS FUNDAMENTAL

### 1.5.1 4.1. Ontological Distinction

"Entity" presumes ontological independence — something existing regardless of observer. This contradicts Axiom (A): *"Reality does not exist in definite state before act of observation."*

"Configuration" is point in space $\mathbb{C}$, realized by specific collective observation act. Depends on observers (their $B$, $A$, $H$), on coherence ($S$) and on history of previous observations ($\Lambda$). It is derivative.

But configuration possesses its own dynamics. Equation (4.4) describes configuration evolution as movement in potential field with inertia and stochastic term. Configuration "resists" (through $I(C)$), "attracts" (through $\nabla U(C)$) and "noises" (through $\eta(t)$). Derivative — but not passive.

### 1.5.2 4.2. Mode of Organization = Potential of Configuration

Environment is "mode of organization of accumulated results." In ODTOE "mode of organization" is potential $U(C)$:

- Same "results" (observers, resources, knowledge) form different configurations $C_1, C_2, \ldots$ with different potentials $U(C_1) \neq U(C_2)$
- Potential determines which transitions "profitable": system tends to minimum $U(C)$, most stable organization
- "Mode" is region of attraction (basin of attractor) in space $\mathbb{C}$

**Environment ≠ sum of results:** same results, organized differently (different potential $U$), give different configuration, different environment, different reality.

### 1.5.3 4.3. Causal Logic

Environment has no independent source. Completely derived from observation processes.

Causal chain in ODTOE:

| Step | Process | Formalization |
|---|---|---|
| 1 | Observers | Set $\{O_i\} = \{(B_i, A_i, H_i)\}$ exists before configuration |
| 2 | Act of observation | Operator $\hat{O}_i(\Psi) = c_j$ with probability $P(c_j \mid O_i)$ |
| 3 | Configuration | $R(t) = F[\{O_i(t)\}, S(t), I(C(t))]$ — reality as result |
| 4 | Feedback | $dB/dt = \gamma \cdot \text{sgn} \cdot d \cdot B(1-B)$ — influence on $B$ |
| 5 | Self-Maintenance | Cycle $R \to B \to R$ ensures self-replication |

Environment is derivative (steps 1–3), but through feedback (step 4) begins influencing creators and reproduces itself (step 5). Derivative — but not passive.

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## 1.6 5. FORMULA OF ENVIRONMENT IN ODTOE TERMS

Formal definition of environment within ODTOE:

**DEFINITION.** Environment is configuration $C \in \mathbb{C}$, characterized by tuple:

$$\boxed{\text{Environment} = \langle\, C,\ I(C),\ U(C),\ S,\ N(t),\ \hat{O}^* \,\rangle}$$

| Component | Environmental Property | Formalization |
|---|---|---|
| $C$ | Configuration | Point in $\mathbb{C}$, realized by collective observation |
| $I(C)$ | Inertia | $\sum w_j \cdot B_j(C)$ — total belief in current state |
| $U(C)$ | Mode of organization | Potential determining landscape of permissible transitions |
| $S$ | Density / Coherence | $1 - \frac{2}{n(n-1)} \sum \|B_i - B_j\|$ — observer synchronization |
| $N(t)$ | Selective Pressure | Number of observers + structure $P_{\text{coll}} = 1 - \prod(1 - B_i^k)$ |
| $\hat{O}^*$ | Second Order | Meta-operator: ability to generate new configurations |

Environment is not “thing,” but six-dimensional “address” in space of all possible collective observation modes. Change to any of six parameters generates different environment.

## 1.7 6. CONCLUSION

Alternative formulation:

> *Configuration of accumulated and interconnected results of processes.*

In ODTOE terms — clarification:

> *Environment is self-supporting configuration in space $\mathbb{C}$, generated by collective observation, possessing inertia $I(C)$, coherence $S$ and potential $U(C)$, ensuring its stability and replication.*

**1. Ontologies coincide:** "environment = configuration, not entity" reproduces ODTOE ontology, where reality is point in $\mathbb{C}$, lacking independent existence until observation.

**2. All five properties derivable:** inertia = $I(C)$, density = $N \times S$, selective pressure = $P_{\text{coll}}$, self-replication = loop $R \leftrightarrow B$, second order = meta-operator $\hat{O}^*$.

**3. Environment as attractor:** stable environment is attractor of dynamical system $\frac{dC}{dt} = -\frac{\alpha}{I(C)} \cdot \nabla U(C) + \eta(t)$. Environment "attracts" observers to configuration and holds them.

**4. Practical consequence:** to create new environment, must change potential $U(C)$ — restructure "landscape" of permissible configurations. Task of meta-environment (type 9) and cohort of influential (type 6).

**5. Environment = managed reality:** if environment is configuration, and configuration generated by observation, then environment design is reality design. ODTOE provides mathematical apparatus for this design.