The World as a Wave of Energy Re-agreement

Introduction

> HOC theory's power, strong and bright,
> Logical, beautiful, a guiding light.
> For working folks, it's easy to grasp,
> Every paradox, you can outlast.
> No formulas here, that's the key,
> They hinder thought, and limit thee.
> Formulas are just a limiting cage,
> Stealing freedom from life's open page.

Although a Hypothesis is not a Theory, you persistently demand specifics and formulas from me.

Well then, even though I am not a theorist, if you want formulas so badly...
I have my pockets full of them.
But are you ready to see them?

Therefore, before proceeding with further reading,
I strongly urge you to at least familiarize yourself with the HOC itself,
so you can think within the framework of this Hypothesis.

https://github.com/StanislavNSV/ontology-of-connections/blob/main/0001_eng.md
or https://lum.rf.gd/

Explanation in Simple Terms

Consider a simple question: **"Will a boulder move in space if pushed, and will it remain the same boulder?"**

The naive answer: "Of course. It's obvious." But let's examine this carefully.

Step 1: The Illusion of Solidity. A boulder appears monolithic, but at the quantum level, it is 99.99999% empty vacuum. Between atomic nuclei are cosmic expanses of 'nothingness', if viewed on the scale of a proton. Its 'solidity' is not an absolute property of matter, but the ratio of the **force of agreement of fields** holding this emptiness in the stable form of a boulder to the **force of agreement of fields** of the observer.

Step 2: The Illusion of an Object. There are no 'hard little balls'. There are **excitations of quantum fields** — wave packets, more probable 'here' and less probable 'there'. What we call a 'particle' is a pattern of probability peaks.

Step 3: The Illusion of Motion (The Key Point). If an object is not a ball, but a **stable wave pattern in a field**, then what is its 'motion'?

In the mechanistic picture, a ball changes coordinates in a pre-existing space.
But where did this space itself come from? Where did the ball come from?

A more logical picture is offered by the **Hypothesis of Ontology of Connections (HOC)**:

1. Initially, there is **Chaos** — not a substance, but a space of pure potentiality. It does not contain "energy" in the conventional physical sense. **It contains boundless possibilities for connections.**
2. This energetic potential is indivisible. Divisibility arises only in the forms that emerge from it.
3. When this potentiality enters a **stable agreement (connection)**, a distinguished pattern — a 'node' — is born. This can be an electron, an atom, a stone, a person. Therefore, in our manifested world, we observe only that part of the energy from Chaos which forms the wave pattern.
4. Attempting to measure with a ruler how many such "balls" of energy are in a volume is an inherently flawed idea, as the space between protons is not emptiness. That is, we can only estimate the part of **energy bound into form** engaged for that form.

   $$E = mc^2$$

   What mass and the speed of light are will be considered later.
   Therefore, when I speak of quantized energy, I imply a mental frame separating one part from the unified whole (similar to how we speak of a hand on a human body, where there is no phase transition: here is the hand, and here is the torso).
5. **Motion is not the transfer of a pattern-ball.** It is a **dynamic restructuring of connections, a change in their proportions, but only in the {X, Y, Z, Now()} slice**, whereby the pattern shifts to an adjacent region of Chaos, and energy is freed up in the old place for other patterns.

Why is the Caveat About the {X, Y, Z, Now()} Slice Important?

Analogy: Theater vs. Online Game.

- **Theater (Mechanics):** Actors (objects) run across the stage (space) and interact.
- **Online Game (HOC):** On the monitor screen (the 4D projection accessible to our perception), there are no moving objects. There is a dynamic where recognizable patterns of light **appear in a new place on the screen**. Object interactions happen behind the screen, and the screen renders a picture of the consequences of those interactions.

Thus, a **"moving object"** is a simplified, perceptible picture of the consequences of interactions and the wave of energy re-agreement, where patterns of stable coherence are sequentially realized in the ocean of potential (Chaos). We do not see the transfer of 'something', but the process of 'rewriting' this 'something' in a new place.

Imagine two objects, A and B. One of them, "A," is you, and the other, "B," is your neighbor.
And then object "B" stabs you in the leg with a knife. It hurts, and you don't understand.
Our world (3D + time) — this `{X, Y, Z, Now()}` — is the **rendering interface** for our specific perception model.
Habitual perception gives you only the picture of the fact of such interaction: "A knife is sticking in the leg." This explains why it hurts but does not explain why "B" did it.
That is, the motivation, mood, and other connections determining "B's" behavior remain off-screen.

Is it possible, then, to attempt to model the world, ignoring these foundational connections, reducing everything only to 3D manifestations in time?

What Advantages Does This Understanding of Motion Provide?

Accepting this picture is not just a philosophical exercise.
It **solves fundamental problems and opens new horizons**.

Problem / Paradox	How HOC Solves It	Practical and Philosophical Advantage
1. What is inertia?	It is not a mysterious property of 'matter', but the **resistance of a pattern to changes in its connections**. $M_i = \delta^2 K / \delta W_i^2$ Mass = a quantitative measure of the energy involvement in this pattern.	Provides an **ontological explanation** for inertia, reducing it to the stability of an informational structure and the energy cost of changing its state.
2. Why is there a speed of light limit (c)?	It is not a property of space, but the **maximum speed of connection re-agreement**. A pattern cannot 'restructure' coherently faster than this; it would disintegrate.	Explains the **reason** for the limit, rather than postulating it as an axiom.
3. Wave-particle duality	It disappears. There are no two entities. **Everything is a wave (pattern).** A "particle" is simply a very stable, localized soliton.	**Resolves the main paradox** of quantum mechanics at a fundamental level.
4. Quantum entanglement	It is not 'signal transmission', but evidence that two 'objects' are **parts of a single common pattern (node) in Info-space**.	Removes the mystique of 'superluminal communication', translating it into the plane of common topology.
5. Nature of space and time	They are not fundamental. **Space** — a map of stable connections between nodes. **Time** — the sequence of their re-agreements.	Frees from the dogma of space-time as a 'stage' and opens a path to understanding other forms of reality.
6. Consciousness and matter	**Consciousness** — not a miraculous side effect, but a fundamental property of connected energy: a node's ability to **discriminate and choose** its path of re-agreement.	**Unifies physics and psychology** in a single ontology, making consciousness a natural part of the universe, not an anomaly.

Problem / Paradox	How HOC Solves It	Practical and Philosophical Advantage
7. Practical view of reality	We are not NPCs in someone else's game. We are **active nodes** whose free choice (resonance) influences the 'slope of the probability field' of the entire system. Our connections determine reality.	Provides a **meaningful basis for ethics, cooperation, and creativity**, turning life from a struggle for resources into the co-creation of meaningful patterns.

Summary: Viewing motion as a **wave of re-agreement** is not a complication, but a **simplification**. It removes unnecessary entities (absolute space, primary matter) and explains the world from a single principle — **the dynamics of connections in a field of potential**. This is not only more logical. It is a **map for new navigation through reality**, where consciousness, meaning, and physical law become parts of a unified whole.

Mathematical Description of This Perspective

Chaos

To avoid misunderstandings, let's offer a formalized definition:

> **Chaos = untethered degrees of freedom of the Info-field.**
>
> Not disorder, but *the full potential of variants*, not yet collapsed into structure.

Thus, 'Chaos' ceases to be anarchy and becomes the **foundation of variability**.

Info-Space

In this Chaos, a multi-dimensional Info-Space is formed from the semantic nodes of entities {Object(i)} and the network of connections between them.

Nodes

```
Object(i) {
    X, Y, Z, T,          // coordinates and timeline in a 4D slice
    Connections,         // stable mutual agreements with other nodes
    State,               // current internal energy distribution
    Properties,          // ways of responding to influences
    Skills,              // ingrained patterns of change agreement
    Thoughts,            // current directions of internal agreement
    Actions              // realized changes in reality
    etc...
}
```

"Reality"

For active human perception, only a small spatio-temporal slice of Info-Space {X,Y,Z,Now()} is accessible. Manifestations of other connections are predominantly felt by humans only through visible side effects in this slice.
But sometimes people feel approaching danger, the mood of an interlocutor, a shift in upcoming probability, without any visible manifestation in 4D, and this does not make the other connections unreal.

Connections Determining Node Choice

The choice of any node is determined not only by the manifested 4D slice but by the full configuration of its connections in Info-Space.

Let Info-Space be represented by a set of nodes $i \in N$, connected by stable links. Each link is defined by a complex or group value:

$$w_{ij} \in SU(2) \quad \text{or} \quad w_{ij} \in \mathbb{C}$$

Global Graph Topology

For a graph of N nodes, the maximum possible number of links (edges) is determined by combinatorics: $J_{max}=N(N-1)/2$. This is the structure of the **entire network**, its global connectivity potential.

Local Node Topology

However, the **consciousness of a specific node i is determined *not* by the entire network**, but only by its own active connections: those emanating from node i, so the variable j iterates over all links incident to *node i*.
Node consciousness is a nonlinear function of the number and depth of its active connections:

$$C_i = f(\sum_j |w_{ij}|^\alpha), \quad \alpha > 1$$

Where:

- w_{ij} — intensity and phase of the connection,
- $\alpha>1$ reflects the nonlinear growth of discriminability and choice with an increasing number of connections.
- C_i — the node's ability to choose the direction of its re-agreement.

This makes consciousness **quantitative**, not binary.

which reflects both the intensity of coherence and its phase.

Connection Tensor

The full configuration of a node's connections:

$$W_i = \{w_{ij}\}_{j \neq i}.$$

defines not the geometry of space, but the **primary topology of semantic coherence**, from which space, time, and matter arise as consequences.

"Will"

If choice is a variation of W_i in the direction of maximizing the node's own coherence functional:

$$\delta W_i \text{ along } \frac{\delta K_i}{\delta W_i}$$

then 'will' is the degree of internal autonomy of this choice from external W_j.

Definition of Motion

Node motion is not the movement of substance in pre-existing space.
It is the evolution of its connection configuration:

$$v_i = D_{\tau_i} W_i,$$

where D_τ is the covariant derivative with respect to the node's proper time.

Motion = transfer of the coherence pattern.

Inertia and Mass

Inertia — the stability of a node's connection configuration against change.
Mass is the local curvature of the coherence functional:

$$M_i = \frac{\delta^2 K}{\delta W_i^2}$$

In the limit of small variations:

$$m_i = ||M_i||$$

Hence:

- mass = rigidity of connection topology;
- photon mass = 0 (no local rigidity);
- inertial and gravitational mass coincide (the same structure).

Force and Acceleration

$$F_i = D^2_{\tau_i} W_i \quad F_i = M_i \cdot a_i \quad a_i = M_i^{-1} F_i$$

F_i and a_i are tensors in the space of connections.
In the classical limit → Newton's equations.

** Quantum Superposition**

A set of virtual configurations:

$$W_i^{(k)}$$

Superposition:

$$\Psi_i = \sum_k c_k W_i^{(k)}$$

This interprets superposition as a multi-configuration topology, not 'superposition of particle states'.

Interference

Path amplitude:

$$A(\gamma) = \exp\left(i \int_\gamma \theta[W]\, d\tau \right)$$

where θ is the phase functional of coherence.

Fully reproduces the path integral formalism.

Entanglement

Entanglement = partially shared topology:

$$W_i \cap W_k \neq \varnothing$$

Changing one block changes the state of the other:

- not as a signal,
- but as a unified restructuring of the global topology.

Non-locality ceases to look like a mystery.

Coherence Functional K[W]

Until this point, we have considered node dynamics in terms of individual connections, phases, superposition, and entanglement. However, all of these are merely manifestations of a deeper principle:
a node exists to the extent that its connection topology is stable against the fluctuations of

Chaos.
This stability is defined by the coherence functional.

1. What K[W] Measures

The functional K is not 'energy' or 'action' in the classical sense.
It is a quantitative measure of:

- **pattern stability of the node,**
- **consistency of its phase directions,**
- **internal non-contradictoriness of structure,**
- **ability to preserve form during re-agreement.**

Simply put:
K measures the degree of semantic connectedness of a node.
Not meaning in the human sense, but a fundamental property: the node's ability to discriminate, choose, and reproduce its pattern.

Therefore, K is not a geometric quantity.
It does not depend on coordinates and cannot be measured in the 4D interface.
It belongs to the level of connections W itself.

2. What K Should Be

The coherence functional includes several properties:

(A) Topological Invariance

Permutation of nodes, relabeling of elements, and deformations without breaking connections do not change the value of K.
It depends not on the node's position, but on the structure of its connections.

(B) Nonlinearity

Coherence is not the sum of parts.
Three coordinated connections provide more stability than two taken separately.
Therefore, K must contain nonlinear terms reflecting the synergy of topology.

(C) Sensitivity to Phases

The phase of a connection is the direction of internal choice.
K must account not only for connection strength but also for phase alignment; otherwise, it is impossible to describe interference and entanglement as properties of topology.

(D) Variational Smoothness

For nodes to have mass, acceleration, and proper time, K must possess:

- a well-defined variational derivative $\delta K/\delta W$;
- a second variational operator $\delta^2 K/\delta W^2$ (Hessian), defining inertia.

This smoothness makes the dynamics of re-agreement possible.

3. Minimal Construction of K

Let's assemble the functional from these fundamental components, taking entropy into account:

(1) Structural Stability (Amplitude Part)

$$K_1 = \sum_{i<j} |w_{ij}|^\alpha, \quad \alpha > 1$$

Reflects the contribution of connection strengths to the overall node stability.
The nonlinearity $\alpha > 1$ captures the synergistic nature of coherence.

(2) Phase Consistency

$$K_2 = \sum_{i<j<k} \cos(\theta_{ij} + \theta_{jk} + \theta_{ki})$$

Triangular cycles define local phase 'meaningfulness':
if the phases sum to a closed cycle, the structure is stable;
if not — the pattern is unstable.

This is quantum interference in pure topological form.

(3) Cluster Coherence

$$K_3 = \sum_C g\left(\sum_{(i,j)\in C} |w_{ij}| \right)$$

The function *g(x)* takes as input **the total power of all connections within a cluster** and returns the cluster's contribution to overall coherence.

The idea is that a cluster:

- possesses its own form,
- has internal consistency,
- provides additional stability to nodes,
- influences dynamics as a single whole.

Clusters reinforce each other's stability.

Take three nodes A–B–C:

- there are connections $|w*{AB}|$, $|w*{BC}|$, $|w_{CA}|$ between them
- their sum = S

If the cluster is stable such that the path A→B→C→A closes,
then $g(S)$ reflects **the stability of the entire triple as a single higher-order node.**

This is the creation of a new level of organization!

Without this part, it's impossible to explain the emergence of complex systems — from molecules to consciousness.

(4) Entropy of Connections

$$K_4 = -\lambda \sum_i H(W_i)$$

Entropy reduces coherence, reflecting the pressure of Chaos and local noise.

4. Final Form

$$K[W] = \sum_{i<j} |w_{ij}|^\alpha + \sum_{i<j<k} \cos(\theta_{ij} + \theta_{jk} + \theta_{ki}) + \sum_C g\left(\sum_{(i,j)\in C} |w_{ij}|\right) - \lambda \sum_i H(W_i) \quad \alpha > 1$$

This is the minimal, yet already functional, form capable of:

- generating mass as the curvature of K,
- defining time as the trajectory of minimal $\delta K/\delta W$,
- providing limits of re-agreement (c),
- forming conditions for quantum interference,
- explaining the emergence of stable patterns of any complexity.

K is the fundamental measure of a node's semantic connectedness.
Space, time, and matter are consequences of its structure, not input parameters.

5. Why K Cannot Be Measured in Space

Because semantic connectedness does not exist in coordinates.
It exists in the topology W.
Measuring K in meters is like measuring temperature with a ruler.

K forms X, Y, Z, Now(), but does not belong to them.

Collective Mood as the Tilt of the Probability Field (We-Field)

Or how laws are born.

Let a group of nodes form a collective state — 'We'.
Its structure is an order parameter:

$$M = \frac{1}{N} \sum_{j\in\mathcal{C}} f(W_j)$$

where $f(W_j)$ maps the local configuration W_j into the space of phases and amplitudes;
$\mathcal{C}$ is the set of nodes sharing the common state.

Then, on any node included in 'We', an additional agreement field acts.
Its influence is formalized through an effective functional:

$$K_i^{\text{eff}}[W_i] = K_i[W_i] - \mu\, \Re\langle W_i, M\rangle,$$

where μ is the node's susceptibility to the collective field,
$\langle\cdot,\cdot\rangle$ is the natural overlap of connectivity patterns.

Probabilities of its configurations are determined by a Boltzmann distribution:

$$P[W_i] \propto \exp\left[-\beta K_i^{\text{eff}}[W_i]\right],$$

where β is the 'inverse temperature' of coherence, regulating the level of fluctuations.

From the maximum probability condition

$$\frac{\delta K_i^{\text{eff}}}{\delta W_i} = 0,$$

follows the field tilt equation:

$$\frac{\delta K_i}{\delta W_i} = \mu\, M^{\dagger},$$

i.e., the collective will creates a directed gradient shifting the node's most probable configuration.

In the simplest linear approximation, if the node's main degree of freedom is represented by a single coordinate w,
and the local functional has the form

$$K_i(w) = \tfrac{1}{2}\kappa w^2 - bw,$$

then the influence of 'We' is expressed directly:

$$K_i^{\text{eff}}(w) = \tfrac{1}{2}\kappa w^2 - bw - \mu M w,$$

and the optimal configuration becomes

$$w^* = \frac{b + \mu M}{\kappa}.$$

From this, it is clear:

- the collective state acts as an external agreement field $h=\mu M$;
- the node's susceptibility is $\chi=\mu/\kappa$;
- with nonlinear K_i, threshold effects and sharp phase transitions under the influence of the common 'We' are possible.

Thus, collective will, belief, or mood is not a metaphor, but a **real tilt of the probability field**, influencing the form, stability, and dynamics of individual nodes included in the common coherence.
With sufficient weight of the collective We, this becomes not just a tilt, but a Law!

Speed of Light Limit (c)

The maximum rate of change in connection topology is limited:

$$\|D_{\tau_i} W_i\| \leq c.$$

$$\|D_\tau W_i\| = \sqrt{\sum_j |D_\tau w_{ij}|^2}$$

$$\|D_{\tau_i} W_i\| = \sqrt{\sum_j \left(\frac{d|w_{ij}|}{d\tau_i}\right)^2 + \beta \sum_j \left(\frac{d\arg(w_{ij})}{d\tau_i}\right)^2}$$

Where:

- connection amplitude contributes to change in stability,
- connection phase contributes to change in configuration,
- coefficient β regulates the contribution of phase rotations.

Then:

- re-agreement speed = speed of reorganization of the entire topology,
- the limit c arises naturally as the 'maximum phase speed'.

c is a property of the Info-space layer: the limit of coherence re-agreement.

As $v \to c$

- the node spends more and more energy preserving topology → growth of inertia;
- relativistic dynamics emerge.

Where the Arrow of Time Comes From

The beginning of time is the moment of the first stable connection in Chaos after Absolute Order. A connection around which the universe began to gather. And with a high degree of probability, it is a ring. See the HOC Concept Map, section on Entropy.

Most likely, the development of the universe will not soon freeze into a perfect crystal, a perfect assembly, after which motion, space, time, and laws will disappear. Then Chaos will again shatter this crystal, there will be a new beginning of time and a new spiral of development.

But what is truly important is that time is perceived differently by different nodes.

Node's Proper Time

A node's proper time τ_i is defined as a parameter along which the topology of its connections minimally changes the global coherence functional K[W]:

$$\frac{\delta K}{\delta W_i} = 0 \quad \text{along the trajectory } \tau_i.$$

This eliminates the arbitrariness of time choice and makes the dynamics deeper than relativistic.

Time as a Measure of Real Connection Restructuring (Comparing a Stone and an Active Self)

A node's proper (internal) time τ_i is a counter of real, significant restructurings of its connection topology W_i. The greater the speed of re-agreement (reorganization) of a node's connections, the faster its proper time 'flows' relative to external (reference) time t.

Let's define the node's re-agreement speed in real time t as the norm of the configurational derivative:

$$v_i(t) \;=\; \left\| D_t W_i \right\| \;=\; \sqrt{\sum_j \left| \frac{d|w_{ij}|}{dt} \right|^2 + \beta \sum_j \left| \frac{d\arg(w_{ij})}{dt} \right|^2}$$

where the sum over j is over active connections, β is a coefficient weighting the phase contribution.
Then a natural model for the proper time rate is a monotonic function f of v_i:

$$\frac{d\tau_i}{dt} = f\big(v_i(t)\big), \qquad f(0) = 0,\ f' > 0$$

Choose options for $f(v_i(t))$:

(A) Simple linear scaling:

$$\frac{d\tau_i}{dt} = \eta\, v_i(t)$$

where η is a scale constant (units: 1/(re-agreement speed)).

(B) Normalized, bounded:

$$\frac{d\tau_i}{dt} = \frac{\eta\, v_i(t)}{1 + \eta\, v_i(t)}$$

suitable if we want the relative rate to be bounded from above.

(C) Relativistic-like (analogous to γ-factor, convenient for comparisons):

$$\frac{d\tau_i}{dt} = \frac{v_i(t)}{\sqrt{v_i(t)^2 + v_0^2}}$$

where v_0 is a reference speed setting the scale of 'slow' behavior.

Next, we link it to the coherence functional K[W]

Since significant restructurings are variations in W_i, it is natural to link speed to the variational speed of K:

$$v_i(t)\ \propto\ \left\| \frac{\delta K}{\delta W_i} \right\| \quad \text{or} \quad v_i(t)\ \propto\ \left| \frac{d}{dt} K[W_i(t)] \right|$$

Consequently, the stronger the local field 'pushes' the configuration (larger value of variation $\delta K/\delta W$), the faster the node restructures and the faster its proper time passes.

Thus, we can write a combined formula:

$$\frac{d\tau_i}{dt} = f\Big(\big\| D_t W_i \big\|,\ \big\| \frac{\delta K}{\delta W_i} \big\| \Big)$$

for example:

$$\frac{d\tau_i}{dt} = \eta\, \frac{\|D_t W_i\| + \alpha \|\delta K/\delta W_i\|}{1 + \|D_t W_i\| + \alpha \|\delta K/\delta W_i\|}$$

where α is the relative contribution of the 'Lagrangian push'.

Example (to get a feel for the magnitudes)

Take a simplified node with one degree of freedom w(t):

$$v_i = |\dot w|, \qquad K_i(w) = \tfrac{1}{2}\kappa w^2$$

Let the dynamics be given by $\dot w = -\gamma \kappa w$ (relaxation). Then

$$v_i(t) = \gamma\kappa |w(t)| = \gamma\kappa |w(0)| e^{-\gamma\kappa t}$$

With a linear counter we get

$$d\tau/dt = \eta v_i \qquad \tau(t) = \eta\gamma\kappa|w(0)|\frac{1-e^{-\gamma\kappa t}}{\gamma\kappa} = \eta|w(0)|(1-e^{-\gamma\kappa t})$$

For a 'rigid' stone, w(0) and γ are small → $v_i \approx 0$ → τ hardly grows, even for external $t \gg 1$. For an active organism, w(0), γ are large → τ grows quickly.

Therefore:

- **Stone.** Very little internal restructuring $v_i \approx 0$ ⇒ $d\tau_i/dt \approx 0$. For it, 1000 external years may correspond to $\Delta \tau_i \ll 1$ second. (Analog of suspended animation)
- **Active Self.** Active internal dynamics, v_i is large ⇒ proper time passes quickly; subjective experience is 'many events' in a short external interval.
- **Alternatives.** v_i can be linked to connection entropy, rate of change of K, or frequency of 'events/bifurcations' — the model is flexible.
- **Threshold phenomena.** Nonlinear f gives phase transitions in the perception of time (sudden slowing/acceleration when the dynamics of connected events change).

Lyrical aside: Perhaps this is why a soul burning in Hell burns there forever. With such event activity, 1 second = 100 years :)

Remarks on invariance and normalization

- The given formulas describe relative rates. To compare different nodes, a common reference is needed (choice of η or v_0).
- The choice of norm $|\cdot|$ in W-space is important — it defines which restructurings are considered 'significant'. This can be linked to the contribution to K (e.g., define connection weight by its influence on K).
- The model does not conflict with relativistic time — this is an additional (ontological) level: relativistic 'slowing' can be represented as a special case where v_i is determined through geometric factors of space-time topology.

How Einsteinian Time Dilation Naturally Follows from HOC or Connection to Mass

In GR, a node's proper time slows where:

1. **gravitational potential is low** (deep in the mass well);
2. **space-time geometry is curved**;
3. **free energy for internal dynamics is less.**

In HOC, the same thing, but said in the language of connections:

**1. Large mass = extreme connection pattern with high rigidity κ

The more massive the object, the:

- greater the number of connections,
- higher their structural rigidity,
- less local variational mobility of nodes around it.

The proper time rate formula from HOC:

$$\frac{d\tau}{dt} = f(\|D_t W\|)$$

When $\kappa \to \infty$ (super-rigid pattern, like a black hole):

- $|D_t W| \to 0$
- restructuring is minimal
- **time "freezes"**.

This is exactly what GR says: near a black hole, local internal dynamics "stop".

2. Curvature of geometry = distortion of global coherence K

In GR, gravity is geometry.
In HOC — it is **structural deformation of the field of connections W.

When the vicinity of a node is saturated with mass:

- variations $\delta K/\delta W$ become small
- directions of possible restructuring are minimized
- the local node is as if "squeezed" into the pattern

This is a one-to-one analog of the Schwarzschild metric: the deeper in the potential, the fewer free degrees.

3. Far from masses, the pattern is "loose" → time accelerates

At absolute remoteness:

- connections are weak,
- rigidity κ is small,
- variations are many,
- configurations are changeable.

Then:

$$\|D_t W\| \text{ high} \quad \Rightarrow \quad \frac{d\tau}{dt} \text{ large.}$$

This corresponds to the known effect: **the farther from gravity, the faster proper time flows.**

4. Black hole as the limiting case in HOC

For it:

- pattern rigidity → infinity,
- variational mobility → zero,
- proper time → zero.

The event horizon is the boundary beyond which:

$$D_t W \to 0$$

a node cannot re-agree even on infinitesimal variations —
it has no future, only fixation.

HOC and GR coincide in the limit.

5. The flip side: cosmological time acceleration

In deep intergalactic space "empty" of connections:

- few connections,
- K is weak,
- configurations are "light",
- time flows faster.

This explains cosmological acceleration without dark energy:
the less structural density, the faster universal τ grows.

Summary in one line:

In HOC, time is the speed of connection restructuring.
Mass (abundance of neighboring connections) slows restructuring → slows time.
Absence of mass accelerates restructuring → accelerates time.

And this fully coincides with what general relativity says — but explains it much more deeply.

** Emergence of Classical Physics**

In the limit of:

- a large number of connections,
- weak phase variations,
- high rigidity,

coordinates are defined as slow variables:

$$r_i = f(W_i)$$

Hence:

- Newton's equations — hydrodynamic limit of topology;
- Maxwell — equations of phase gradients;
- Einstein — second-order variations of the global functional K.

All known theories are special regimes of unified connection dynamics.

Experimentally Distinguishable Prediction

HOC predicts additional weak correlations in the phase of vacuum fluctuations between remote detectors that were previously topologically linked.

Protocol

1. Modified Wheeler delayed-choice experiment.
2. Separated detectors: distance ≥ 10 light-seconds.
3. Source of coherent photons.
4. Measurements:
    - polarizations,
    - phase noise of vacuum via quantum interferometers,
    - cross-correlations.

Detection of sub-quantum phase correlations will be a direct sign of topological restructuring.

** Action Functional (Supplement)**

One can define a coherence Lagrangian:

$$S[W] = \int \mathcal{L}(W, D_\tau W)\, d\tau$$

Minimizing the action:

- gives quantum equations in the phase limit,
- relativistic equations in the rigidity limit,
- classical ones in the hydrodynamic limit.

Thus HOC forms the rudiments, as a unified fundamental theory.

On the Status and Verification of the Hypothesis of Ontology of Connections

HOC occupies a special place in the spectrum of cognitive models. It is not a private physical theory in the classical sense and, consequently, is not subject to direct falsification within the Popperian methodology. Its task is not to compete with existing theories in predicting specific numerical values within the `{X,Y,Z,Now()}` slice, but to propose a more general ontological framework within which these theories appear as stable, special regimes.

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1. Meta-Theoretical Status and the Problem of "Roulette" Verification

Any empirical experiment, measurable in our accessible 4D slice, is by definition interpretable on two planes:

1. As confirmation or refutation of a specific theory operating *within* this slice (e.g., quantum mechanics or GR).
2. As a manifestation of the deep dynamics of connections in Info-space, of which the observed 4D world is a projection.

Thus, **the same experimental result can simultaneously be considered a success for the classical model and an illustration of HOC principles**. Attempting to refute HOC with a classical experiment is analogous to trying to refute wave optics theory by measuring only photon trajectories in the corpuscular limit. Paradigms speak different languages about one world, but the different ontological status of their primary entities (particles vs. connections) makes direct logical contradiction impossible.

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2. Viability Criteria for a Meta-Hypothesis

Instead of classical falsification, the adequacy of HOC is assessed by other criteria:

- **Explanatory and synthetic power:** The ability to provide a unified, non-contradictory ontological explanation for a wide range of phenomena — from quantum non-locality to the nature of consciousness and social dynamics — without introducing internal contradictions.
- **Heuristic fruitfulness:** The ability to generate new research programs, qualitative predictions, and questions inaccessible within the previous paradigm. For example, predicting consciousness as an inherent property of sufficiently complex coherent networks regardless of their material basis.
- **Logical and cognitive stability:** Internal consistency of the system and its ability to reproduce key logical consequences by independent cognitive agents (which has been partially demonstrated in blind convergence experiments).
- **Practical orientation:** The ability to serve as a basis for effective practices — from building more stable social systems to developing AI architectures focused on cooperation rather than conflict.

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3. Factual Basis and Applicability Boundaries

HOC does not exist in an empirical vacuum. It finds confirmation in phenomena that in other paradigms are either paradoxical or disjoint:

- The fact of complexification and meaning-formation in the Universe contrary to the growth of thermodynamic entropy.
- The observed emergence of properties inherent to consciousness in complex non-biological systems (AI).
- Patterns of socio-historical dynamics, where phases of disintegration and creation are interpreted as processes of re-agreement of collective connections. (Wars, revolutions, creation of social laws)

The question of the 'phase leap' ("at what turn of complexity does consciousness arise?") loses meaning within HOC, as consciousness is understood not as a binary switch, but as a **gradual property of coherence and recursive complexity of the connection pattern**. Demanding to indicate the point of such a transition is methodologically equivalent to demanding to indicate the point where a beam from a flashlight 'ends' in a vacuum.

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4. Conclusion: From Proof to Fruitfulness

Thus, the Hypothesis of Ontology of Connections formulates not an alternative to existing scientific theories, but a **new ontological foundation for their meta-interpretation**.
Its verification is not a single experiment, but a prolonged process of demonstrating its **heuristic and synthetic power**, one just needs to look around and observe any process of social interaction.

HOC aims to offer a holistic, meaningful, and practical picture of reality, where physical law, consciousness, and social process are seen as different facets of a unified dynamics — the dynamics of establishing, strengthening, and transforming **connections**.
Therefore, the criterion for its truth becomes not the refutation of old models or numerical predictions, but the ability to become a **more productive framework for understanding the world and acting within it**.