# WILL Part I (Addition)
## *Substantialism vs. Relationalism*

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## 0.1 No-Go Theorem for Fundamental One-Point Dynamics

### Foundational Assumptions

**Definition 0.1** (Self–Centering)**.** *Each observer defines itself as the relational origin:*

$$(\beta, \kappa) = (0, 0).$$

*This is an ontological definition of the observer's state, not a coordinate choice.*

**Definition 0.2** (Relational Reciprocity)**.** *The only invariant quantity between two observers is the norm of the Total Relational Shift:*

$$Q^2 = \beta^2 + \kappa^2.$$

*Reciprocity is invariance of this norm under the self–centering operation performed independently by each observer.*

**Definition 0.3** (Absence of Background)**.** *There exists no shared background structure: no global state space, no external time parameter, and no common coordinate system simultaneously hosting the states of distinct observers.*

**Definition 0.4** (Operationality)**.** *A physical quantity is admissible only if it is either:*

1. *directly measurable, or*

2. *algebraically derivable from measurable quantities,*

*without invoking non-observable auxiliary structures.*

### Target Class

**Definition 0.5** (One–Point Dynamics)**.** *By one-point dynamics we mean any formulation in which:*

- *a system is represented by a state x in a global space,*

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[*]This work is archived on Zenodo: ˛

- *physical law is given by a local evolution rule*

$$\dot{x} = F(x) \quad or \quad \delta x = \mathcal{L}(x),$$

- *temporal evolution is defined as transitions of the same point through neighboring states.*

*This includes Lagrangian, Hamiltonian, field-theoretic, and metric-based formulations.*

## No-Go Result

**Theorem 0.6** (No-Go for Fundamental One–Point Dynamics). *Under Self–Centering, Relational Reciprocity, Absence of Background, and Operationality, no one-point dynamical formulation can be simultaneously:*

1. *relationally reciprocal,*

2. *operationally well-defined,*

3. *background-independent,*

4. *ontologically minimal.*

*Therefore one-point dynamics cannot be fundamental.*

*Proof.* **A one-point evolution law implicitly assumes a persistent identity of the system across states:** it must be meaningful to say that the system at $x(t_1)$ and at $x(t_2)$ is *the same system.* This is a substantialist commitment — an intrinsic identity independent of relational context.

**Under Absence of Background, no such structure exists:** states are defined only through mutual relational shifts $Q$. The continuous trajectory $x(t)$ — and with it $\dot{x}$ or $\delta x$ — is an auxiliary construct requiring non-observable distinctions between arbitrarily close states, inadmissible by Operationality.

**By Self-Centering, an observer is always at $(\beta, \kappa) = (0, 0)$ in its own relational origin:** there is no operationally available notion of an observer's own worldline as a sequence of distinct states inside a shared arena. Any attempt to define such a sequence introduces an external state-labeling structure, contradicting Absence of Background.

**By Relational Reciprocity, only the scalar norm $Q$ is invariant under mutual self-centering:** directional quantities required by one-point dynamics — such as signed increments, tangent vectors, gradients, forces, or local generators of change — are not reciprocity-invariant objects and therefore cannot be fundamental relational observables.

**To restore a well-defined one-point dynamics, one must add at least one of the following:** a global time parameter; a shared state manifold; a persistent identity map between the same system at different moments; or a background metric or symplectic structure that defines local generators.

**Each of these additions violates Absence of Background** and breaks the relational closure enforced by Self-Centering and Reciprocity.

**Therefore, under the stated foundational methodological constraints, one-point dynamics cannot serve as a fundamental description.** □

**Corollary 0.7** (Constraint–Based Fundamental Law). *Under the same assumptions, admissible fundamental laws must be algebraic and relational: they constrain mutual states through reciprocity-invariant quantities (such as $Q$ and closure relations) rather than prescribing one-point evolution.*

## 0.2 Theorem of Minimality for Relational Constraint Laws

### Purpose

We prove that even if one-point dynamics is permitted as a non-fundamental descriptive tool, it is strictly non-minimal. Relational constraint-based formulations are provably optimal with respect to ontological and operational economy.

### Primitive Count and Ontological Cost

**Definition 0.8** (Ontological Primitive). *An ontological primitive is any irreducible structure that must be assumed in order to formulate a physical law and that cannot be eliminated by algebraic redefinition. Examples include background time, global state manifolds, local generators, metrics, or identity maps between states.*

**Definition 0.9** (Ontological Cost). *The ontological cost of a formulation is the minimal number of independent primitives required to state its laws in a closed and operationally meaningful form.*

### Minimal Relational Formulation

**Lemma 0.10** (Primitive Content of Relational Constraint Laws). *A relational constraint-based formulation requires only:*

- *self–centering of observers,*

- *relational reciprocity,*

- *algebraic invariants between relational projections.*

*No background structures, generators, or evolution parameters are required.*

*Proof.* Relational constraints relate observable projections directly through algebraic identities such as

$$Q^2 = \beta^2 + \kappa^2 \quad \kappa^2 = 2\beta^2 \quad \Delta E_{A \to B} + \Delta E_{B \to A} = 0$$

These quantities are dimensionless, operationally measurable, and invariant under self–centering. No additional structure is needed to define or apply such relations. $\square$

### Primitive Content of One–Point Dynamics

**Lemma 0.11** (Primitive Inflation in One–Point Dynamics). *Any one-point dynamical formulation requires the introduction of at least one additional ontological primitive beyond those of relational constraints.*

*Proof.* To define a local evolution law $\dot{x} = F(x)$ or $\delta x = \mathcal{L}(x)$, one must introduce:

- a global space of states hosting $x$,

- a rule identifying the same system across multiple states,

- an ordering parameter distinguishing "before" and "after",

- a generator defining local change.

At least one of these structures is irreducible: by the No-Go Theorem (0.1), no such ordering or identity structure can be derived from relational methods alone without introducing additional background assumptions. $\square$

## The Minimality Theorem

**Theorem 0.12** (Strict Minimality of Relational Constraint Laws)**.** *Among all formulations capable of reproducing the same observable predictions, relational constraint-based laws have strictly lower ontological cost than any one-point dynamical formulation.*

*Proof.* By the first lemma, relational constraint laws achieve closure using only self–centering, reciprocity, and algebraic invariants. By the second lemma, any one-point dynamical formulation requires at least one additional primitive not present in the relational scheme. Therefore the ontological cost of one-point dynamics is strictly greater. Since relational constraint laws reproduce the empirical content of one-point dynamics (as demonstrated by the explicit derivations in **WILL Trilogy:(??)** and do so with strictly lower ontological cost, the relational constraint formulation is minimal. □

**Remark 0.13.** *Throughout this section,* fundamental *is used in the sense of ontologically minimal and operationally closed: a formulation is fundamental if it requires no primitives beyond those that are directly measurable or derivable from measurable relational invariants.*

## Operational Consequence

**Corollary 0.14** (Redundancy of One-Point Dynamics)**.** *Any one-point dynamical law is either:*

- *empirically redundant with respect to an underlying relational constraint, or*

- *dependent on surplus ontological structure.*

  ***In neither case can it be fundamental.***

## Summary

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**Minimality Result**

$$\boxed{\text{Relational Constraints} \ < \ \text{One–Point Dynamics}}$$

The inequality denotes strict ontological and operational minimality. Substantival formalisms persist only as descriptive approximation of a more economical relational structure.

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# 1 General Consequence

The adoption of substantialist assumptions, as identified in the preceding theorems, produces three structural consequences:

1. Inflated Formalism: Equations multiply to compensate for ontological error.

2. Loss of Transparency: Physical meaning becomes hidden behind coordinate dependencies.

3. Empirical Fragmentation: Each domain (cosmology, quantum, gravitation) requires separate constants.

By contrast, Relationalism as good philosophy-**epistemic hygiene**-enforces relational closure and yields simplicity through necessity, not through approximation.

In short: | **Ontological assumptions generate complexity. Relational minimalism reveals g**

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**Daring Remark**

The Strict Minimality Theorem demonstrates that mathematical complexity is not an inevitable feature of physical law but a structural consequence of surplus ontological assumptions. When those assumptions are removed, the same empirical content is reproduced with strictly fewer primitives.

| Surplus Ontology | $\Longrightarrow$ | Ontological Duplication | $\Longrightarrow$ | Mathematical Inflation |

| **Mathematical complexity is the symptom of philosophical negligence.** |

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