

Reality as Interaction: A Proposed Foundational Axiom for GIBM

Disclaimer: This note proposes a foundational axiom for discussion and criticism. It is not presented as a proof of reality, but as a candidate framework for defining reality within GIBM.

Abstract

The nature of reality has been debated across philosophy, mathematics, and physics for centuries. This note proposes a simple foundational axiom for discussion within the Generalized Interaction-Based Model (GIBM):

$[R := (I, \backslash \text{prec})]$

where (R) denotes reality, (I) denotes the total admissible interaction set, and $(\backslash \text{prec})$ denotes the ordering or constraint structure relating interactions.

Under this view, reality is not fundamentally composed of objects that interact. Rather, reality is the total interaction structure itself. Objects, observations, and persistence emerge as special classes of interaction.

This note is intended as a discussion proposal and invitation for criticism rather than a completed theory.

1. Motivation

Many descriptions of reality begin by assuming the existence of objects, particles, fields, observers, or spacetime.

This proposal asks whether interaction may be more fundamental than any of these.

Instead of:

Objects $\rightarrow$ Interactions

the proposed direction is:

Interactions $\rightarrow$ Persistence $\rightarrow$ Objects

If correct, reality is more naturally described as an interaction structure from which familiar physical entities emerge.

2. Primitive Definition

Interaction is taken as the primitive concept.

Interaction:

Any admissible relation or event that produces, constrains, alters, resolves, or preserves distinction.

No prior assumption of objecthood is required.

3. Reality Axiom

Define:

- (R) = Reality
- (I) = Total admissible interaction set
- $(\backslash \text{prec})$ = Ordering or constraint relation among interactions

Then:

$[R := (I, \backslash \text{prec})]$

Reality is therefore identified with the complete ordered interaction structure.

4. Null Reality Condition

If no interactions exist:

$[I = \backslash \text{varnothing}]$

then:

$[R = \backslash \text{varnothing}]$

or:

$[I = \backslash \text{varnothing} \rightarrow R = \backslash \text{varnothing}]$

A reality containing no interactions, distinctions, constraints, or relations is physically indistinguishable from non-existence.

5. Persistence and Objects

Define persistence:

$$[P \subseteq I]$$

where (P) denotes persistent interaction structures.

Objects are then defined as:

$$[\text{Object} := P]$$

Objects are not fundamental entities. Objects are persistent structures within the interaction network.

6. Observation

Let:

$$[O \subseteq I]$$

Observations are defined as outcome-resolving interactions.

Thus:

$$[\text{Observation} := O]$$

Every observation is an interaction, but not every interaction is an observation.

7. Models, Thoughts, and Reality

Thoughts, equations, memories, and models are themselves interactions and therefore belong to reality.

However:

The existence of a model of (x) does not imply the existence of (x) as a persistent external structure.

A thought is real as an interaction.

Its interpreted content is not automatically externally real.

8. Open Questions

The purpose of this note is not to claim completion, but to identify questions that require further analysis.

Examples include:

- What precisely qualifies an interaction as admissible?
- Is interaction more fundamental than distinction?
- Can a single interaction exist in isolation?
- How does spacetime emerge from ordered interaction structure?
- Does the axiom possess predictive power beyond definition?
- What mathematical invariants exist over (I)?

9. Invitation for Criticism

This proposal is offered as a foundational axiom candidate for GIBM.

The primary question is not whether the axiom is appealing, but whether it fails.

Readers are encouraged to identify:

- Contradictions
- Circular definitions
- Counterexamples
- Physical phenomena incompatible with the framework
- Alternative formulations that improve precision

The goal is refinement through criticism rather than defense of a fixed conclusion.