Qeios

Peer Review

Review of: "Observers as Agents: Relational Epistemology from Physics to Ecology"

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Commentary on "Observers as Agents: Relational Epistemology from Physics to Ecology" by G. Dodig-Crnkovic

The paper under review rightly challenges the classical notion of an observer-independent science and emphasizes that knowledge is always perspectival. However, the conceptual framework presented —"observer as agent" grounded in infocomputationalism—contains a major epistemological confusion.

The key problem is the **conflation of interaction with relation**. Within the author's account, any system that interacts—a molecule, enzyme, bacterium, or ecosystem—is labeled an "observer." This trivializes the concept. From the perspective of **LRT (Tridifferential Relational Logic)**, **interaction is not the same as relation**.

Interaction refers to causal or physical couplings, such as collisions, bindings, or exchanges of energy.

Relation, in LRT, is a tridifferential configuration of **position, function, and sense**. It involves not just contact or coupling, but a structured field where meaning, legitimacy, and symbolic validation emerge.

In other words, while all relations involve interactions, not all interactions constitute relations. For instance, two molecules may interact chemically, but they do not establish a relation in the LRT sense, since there is no symbolic validation nor shared field of meaning.

This confusion leads to further weaknesses:

By expanding "observer" to any interactive system, the term loses explanatory force.

The model reduces epistemology to **information processing**, neglecting the relational dimension of **sense**, which is essential in scientific, ecological, and social knowledge.

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Objectivity is reduced to representational “translation protocols,” whereas **LRT grounds objectivity in trivalent validation** (scientific, communal, institutional).

In sum, Dodig-Crnkovic is correct to highlight the indispensability of the observer, but the framework presented remains conceptually weak. By equating interaction with relation, it risks both anthropomorphizing natural systems and trivializing epistemology. **LRT offers a stronger alternative**: it distinguishes interaction from relation, articulates the tridifferential structure of observation (position, function, sense), and integrates symbolic legitimacy into the very core of knowledge production.

Restoration Ecology

Interaction: measuring how many liters of water are injected into a degraded wetland (artificial irrigation in the Salar de Punta Negra).

Relation: assessing whether that water input restores the **positional, functional, and symbolic configuration** of the ecosystem (return of key species, functional redundancy, and community legitimacy).

Practical implication: a project may show “success” at the level of interactions (water added, vegetation cover) but fail at the level of relations (no resilience, no positive VNRe).

2. Cognitive Neuroscience

Interaction: synaptic activity recorded in an EEG when exposing a subject to a visual stimulus.

Relation: integration of that signal within a functional circuit that organizes memory, attention, and the cultural meaning of the stimulus.

Practical implication: without distinguishing relation from interaction, there is a risk of reducing cognition to electrical correlations, while ignoring the level of **meaningful configuration**.

3. Epidemiology and Public Health

Interaction: a vaccine generates antibodies in an organism.

Relation: community acceptance of the vaccine, trust in institutions, and the symbolic meaning of care

Practical implication: a clinical trial may show biological efficacy (interaction), but the health policy fails if relational legitimacy is absent (social rejection → epidemic outbreaks).

4. Social Systems

Interaction: the number of messages exchanged on a digital social network.

Relation: the tridifferential structure of **who occupies what position, what role is fulfilled, and what shared sense is created** through those messages (trust, authority, community).

Practical implication: studies focused only on interactions (number of likes, retweets) confuse volume with cohesion; real relations require analyzing centrality, leadership, and symbolic legitimacy.

5. Artificial Intelligence Research

Interaction: a machine learning model adjusts weights in a neural network after receiving a dataset.

Relation: the model's use in social contexts, where it acquires sense and function in relation to norms, users, and purposes.**Practical implication**: an algorithm may work technically (interaction with data) but be socially unviable if it produces illegitimate biases (relation).

Conclusion

Interaction describes a punctual or causal contact.

Relation, in **LRT (Tridifferential Relational Logic)**, requires a tridifferential configuration (**position, function, sense**) that determines viability, legitimacy, and sustainability.

In scientific practice, confusing interaction with relation leads to reductionist metrics that may appear successful but **do not guarantee viability or resilience**.

Quantum Physics, Ecopoiesis, and Tridifferentiality

Quantum physics describes interactions, not relations in the tridifferential sense.

1. Quantum physics → the world of interactions

Quantum phenomena (superposition, entanglement, decoherence) are causal couplings formalized in the mathematical language of operators, density matrices, and probability amplitudes.

At this level, there is no **position, function, and sense** simultaneously, but only interactions among systems, fields, and instruments.

The “observer” in quantum theory is an operational concept (an apparatus, a reference frame), not a relational agent.

2. Tridifferential relation and ecopoiesis → exclusive to the living

Tridifferentiality (position–function–sense) belongs to living and cognitive systems, because only there does **sense** appear as an irreducible dimension.

A detector measures (interaction), but it does not observe in the tridifferential sense: it lacks the symbolic dimension and the communal validation that characterize observation in living beings.

Life is **ecopoietic**: every living unit does not merely interact, but **tridifferentiates its entornar**—that is, it co-configures a relational world through position, function, and sense.

Only living organisms (and their cultural/communal networks) can establish **ecopoietic, tridifferential relations**.

3. Practical implication of the distinction

When in quantum physics one speaks of an “observer,” what is really being described is a system of interaction that defines relative results (Rovelli, QBism).

If we confuse this with relation, we make the mistake of extending **ecopoietic tridifferentiality** to the inanimate, trivializing the concept.

LRT (Tridifferential Relational Logic) corrects:

Physics → describes interactions.

Biology / life / society → describe **tridifferential, ecopoietic relations**.

In summary

Quantum physics is about interactions.

Ecopoiesis and **tridifferentiality (position, function, sense)** appear only in living beings and their social/ecological networks.

This distinction prevents epistemological confusion, such as labeling molecules or physical systems as “observers,” when in reality they only interact.

Declarations

Potential competing interests: No potential competing interests to declare.