

**The Attralucian Essays:**  
Exploring the Finite



First Edition

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# The Attralucian Essays



Semantic Coupling to Observation:  
Protein Binding, LIGO, and the  
Conversion of Dynamic Measurement  
into Fixed Symbols

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## *Semantic Coupling*

# Semantic Coupling to Observation: Protein Binding, LIGO, and the Conversion of Dynamic Measure- ment into Fixed Symbols

## Overview

This report develops a comparative critique of two apparently different scientific domains: AI-assisted protein–ligand binding prediction and LIGO gravitational-wave detection. The purpose is not to reject either field, nor to deny the value of their measurements, instruments, models, or computational methods. The purpose is to identify a repeated structural issue: *semantic coupling to observation*. In both cases, a complex dynamic measurement process is converted into a fixed symbolic noun. In drug discovery, a layered biochemical interaction becomes “binding.” In LIGO, a dynamic interferometric measurement process becomes “a gravitational wave event” or “a black-hole merger.” The issue is not merely that models

are uncertain. The deeper issue is that a finite, dynamic, instrument-mediated interaction is converted into a stable noun-form. This noun then slows the apparent rate of change of the phenomenon. It allows the result to be handled, circulated, compared, benchmarked, narrated, and institutionalised. But in doing so, it may conceal the measurement chain that produced it.

## **A Note on the Status of This Essay**

This essay is a philosophical critique of scientific language, grounded in the commitments of Geofinitism (measurement first, finite symbols, irreducible uncertainty, provenance). It is not a technical contribution to Finite Symbolic Mechanics (FSM). Readers seeking the formal framework should consult the core FSM documents, including *The Alphonic Limit and the Nexil*, *Alphonic Projection Layers*, and *The Dynexil*. This essay applies those commitments to two concrete cases: protein binding and LIGO.

## **Introduction: Semantic Coupling Defined**

By *semantic coupling to observation* we mean the process by which a complex dynamic measurement becomes so tightly attached to a fixed noun that the noun is mistaken

for the measurement itself.

The measurement does not arrive already named. The instrument does not produce “binding,” “affinity,” “gravitational wave,” or “black-hole merger” as direct outputs. It produces finite traces, signals, readings, deflections, rates, noise-filtered patterns, assay responses, intensity changes, time-series data, or computationally processed values.

The scientific system then names these outputs. That naming is not trivial. It is an act of symbolic stabilisation. A dynamic process becomes a noun. A changing interaction becomes an object of discourse. A temporally extended measurement chain becomes a short phrase. That phrase can then be used as if it were stable, portable, and self-evident.

This is scientifically useful. Without symbolic compression, no discipline could function. But the danger arises when the compression is forgotten. The symbol begins as a useful fiction. It becomes a working noun. It then becomes treated as though it were the thing itself.

## **The General Structure: Dynamic Interaction to Fixed Noun**

The repeated pattern can be written compactly:

dynamic interaction

- finite measurement
- processed signal
- symbolic compression
- fixed noun
- explanatory narrative
- institutional certainty

A Geofinite critique therefore asks us to separate:

- the dynamic interaction;
- the measurement process;
- the symbolic compression;
- the fixed noun;
- and the later narrative explanation.

The key claim is simple: science often turns dynamic measurement processes into fixed symbols, then treats those fixed symbols as if they were the measured reality itself.

## **Dynamic Interaction and Symbolic Slowing**

A key Geofinite insight is that nouns are not simply static things. They are slowed processes. A noun is a region of language where the rate of visible change has been reduced enough for the symbol to be handled.

In measurement science, this slowing is essential. A dynamic interaction must be slowed into a symbolic form

before it can enter analysis, communication, publication, modelling, and institutional memory.

For example:

- a biochemical interaction becomes “binding”;
- a rate-dependent assay response becomes “affinity”;
- a complex instrument disturbance becomes “strain”;
- a processed waveform becomes “event”;
- a long explanatory chain becomes “detection.”

The noun is not false. But it is compressed. The problem is not noun formation itself. The problem is the loss of awareness that the noun is a slowed symbolic form of a dynamic measurement process.

## **Protein Binding: The First Case**

In the protein binding problem, the ordinary language of the field suggests a relatively simple relation. A molecule binds to a protein. A computational method predicts that binding. A model is judged by how well its predictions match experimental results.

But this simple account hides a deep chain of dynamic processes.

A protein is not a static lock. A ligand is not simply a key. Binding is not a single digital event. The biological and chemical situation includes protein production through serial coding systems; folding and misfolding pathways; conformational ensembles; solvent effects; charge distributions; local structural changes; temperature-dependent behaviour; rate kinetics; assay design; measurement noise; instrument calibration; statistical processing; and historical conventions about what counts as a binding value.

The word *binding* therefore compresses a dynamic interaction landscape into a relatively fixed symbolic object. This compression is useful because it allows drug discovery to operate. Researchers need tractable values. They need rankings, scores, thresholds, and comparative measurements. But the word *binding* should not be mistaken for a direct window into the full biological interaction.

In practice, an AI system trained to predict binding is not predicting the total biological reality. It is predicting a symbolic compression produced by prior experimental systems and modelling choices. It may be predicting a rank order. It may be predicting a value derived from a particular assay. It may be predicting the historical residue of similar systems in the training data. It may be interpolating across a familiar chemical and biological neighbourhood. But none of these is equivalent to saying that the AI has understood the full dynamic process.

## The Protein Binding “Why” Problem

The word *why* becomes unstable here. If a method fails and we ask, “Why did the binding prediction fail?”, we may think we are asking a simple technical question. But the question already assumes that *binding* is the correct stabilised object. It assumes that the model target is well-defined. It assumes that the measurement convention captures the relevant biological process. It assumes that the failure can be explained inside the existing symbolic frame. (The same structural issue will appear in the LIGO case below.)

A more careful question would be:

What dynamic interaction was measured, how was it slowed into a symbol, what assay or computational process created the binding value, and what part of that symbolic chain did the AI model reproduce or fail to reproduce?

This moves the critique one layer deeper. The problem is not simply that AI may fail outside its training data. The deeper problem is that the training data itself consists of compressed symbols produced from dynamic measurement processes. The AI is therefore not predicting reality directly. It is predicting prior symbolic stabilisations.

## **LIGO: The Second Case**

The same pattern appears in LIGO, though the domain is very different.

In public and scientific language, LIGO is often described as having detected gravitational waves from black-hole mergers. This phrasing has become familiar and powerful. But it is also a semantic compression.

At the measurement level, LIGO registers finite disturbances in an interferometric apparatus. These disturbances occur within a complex instrument system involving mirrors, lasers, seismic isolation, calibration procedures, environmental noise, thermal effects, and data-processing pipelines. The instrument does not directly output the phrase “black-hole merger.” It produces time-series data. That data is filtered, calibrated, compared, statistically evaluated, and interpreted through a model-conditioned framework.

Only after this chain does the short noun phrase appear: *gravitational-wave event* or, more specifically, *binary black-hole merger*.

From a Geofinite perspective, the concern is not that this reconstruction is necessarily wrong. The concern is that the fixed phrase may conceal the dynamic measurement process that produced it.

## **The LIGO Symbolic Chain**

The LIGO chain can be expressed as follows:

a finite interferometric disturbance occurs;  
the disturbance is registered as time-series data;  
the data is cleaned, filtered, and calibrated;  
candidate signals are selected;  
waveform templates are applied;  
statistical thresholds are used;  
parameters are inferred;  
a narrative explanation is produced;  
the result is named as an event.

The final phrase, “black-hole merger,” is not the initial measurement. It is the end point of a symbolic transformation. The dynamic measurement process has been slowed into a noun. That noun then becomes available for wider discourse. It can be placed in a paper title, a press release, a public lecture, a textbook, or a historical account of physics.

Again, the problem is not that this is useless. It is essential to scientific communication. But the compression must remain visible. The Geofinite critique is that the phrase “LIGO detected a black-hole merger” semantically couples the fixed noun too tightly to the measurement process.

A cleaner formulation would be:

LIGO measured finite interferometric disturbances that were processed through a model-conditioned pipeline and interpreted as consistent with a gravitational-wave signal associated with a binary black-hole merger.

This is slower language. But that is precisely its virtue. It prevents the noun from outrunning the measurement.

## **The LIGO “Why” Problem (cf. Protein Binding)**

The same *why* problem appears here. If someone asks, “Why did LIGO detect this signal?”, the conventional answer may be: “because two black holes merged.” But that answer already assumes the explanatory basin. It assumes the model has been stabilised. It assumes the processed signal has been correctly named. It assumes that the fixed noun “black-hole merger” is the right symbolic destination for the measurement chain. (See the discussion of the “why” problem in the protein binding section for the parallel structure.)

A more careful question would be:

What finite disturbance was measured, how was it processed, what model commitments shaped the reconstruction, and how did the explanatory chain become stabilised as the noun phrase “black-hole merger”?

This does not deny the value of the explanation. It simply relocates the explanation to the correct level. The *why* is not primary. The measurement chain is primary. The noun is downstream. The narrative is downstream of the noun.

## Comparison of the Two Cases

The protein binding case and the LIGO case share a structural pattern.

- In protein binding, the dynamic process is biochemical. In LIGO, the dynamic process is instrumental and astrophysical as interpreted through a physical model.
- In protein binding, the fixed noun is “binding” or “affinity.” In LIGO, the fixed noun is “gravitational wave” or “black-hole merger.”
- In protein binding, AI predicts values derived from prior measurement conventions. In LIGO, a signal-processing pipeline reconstructs an event through prior theoretical commitments.
- In both cases, a dynamic interaction is transformed into a fixed symbol.
- In both cases, the fixed symbol enables slower, more stable discourse.

- In both cases, the danger arises when the symbolic compression is mistaken for direct observation.

The shared issue is therefore not specific to biology or physics. It is a general issue in scientific language. The scientific process requires compression. But it also requires remembering that compression has occurred.

## **Why This Matters for AI and for LIGO**

This critique is especially important in the age of AI. AI systems are powerful at learning from stabilised symbolic traces. But those traces are already compressed outputs of prior measurement and interpretation. If this is forgotten, AI predictions may acquire a false aura of directness.

In protein binding, the AI does not encounter the living interaction directly. It encounters datasets. Those datasets contain values already shaped by instruments, assays, conventions, selections, exclusions, publication histories, and modelling decisions. The AI then learns patterns within this compressed symbolic landscape. It may be useful. It may be fast. It may be operationally powerful. But it is still operating on symbolic residues.

This is why the phrase “AI predicts binding” should be handled carefully. More precisely:

AI predicts patterns in historically stabilised binding measurements.

That is a very different claim.

The same caution applies to LIGO. The LIGO pipeline does not merely receive meaning from the universe. It constructs a candidate meaning through an instrument–theory–processing chain. A disturbance becomes a signal. A signal becomes a waveform. A waveform becomes an event. An event becomes a black-hole merger. A black-hole merger becomes a sentence. A sentence becomes a scientific fact.

Each transformation may be justified. But each transformation should remain visible. The critique is not that the chain is invalid. The critique is that the chain becomes hidden by the noun.

## **A Geofinite Reformulation**

A Geofinite reformulation would avoid premature noun certainty.

Instead of saying:

“AI predicts protein binding,”

we might say:

“AI estimates patterns within previously stabilised measurements of protein–ligand inter-

action under particular experimental and modelling conditions.”

Instead of saying:

“LIGO detected a black-hole merger,”

we might say:

“LIGO measured finite interferometric disturbances that were processed and interpreted through a gravitational-wave model as consistent with a binary black-hole merger.”

These formulations are longer. But they preserve the measurement process. They resist premature semantic closure. They keep the dynamic interaction visible behind the noun.

## **The Central Comparative Claim**

The central comparative claim is:

Both AI protein-binding prediction and LIGO gravitational-wave detection involve the conversion of dynamic measurement processes into fixed symbolic nouns. These nouns are then semantically coupled to observations so tightly that the distinction between measurement, processing, interpretation, and narrative explanation becomes blurred.

This is the repeated issue across disciplines. The shared danger is not simply that scientists may be wrong. The deeper danger is that the language of science can make a reconstructed symbolic compression appear to be a directly observed thing.

## **Conclusion**

The protein binding problem and the LIGO detection problem are not the same scientifically, but they share a deep structural similarity.

Both involve complex dynamic measurement processes. Both rely on instruments, models, uncertainty, processing, and interpretation. Both compress these processes into stable scientific nouns. Both then build explanatory narratives around those nouns.

The Geofinite critique is not that such compression should be forbidden. Science could not proceed without compression. The critique is that compression must be remembered. A noun is a slowed process. A scientific object-name is a stabilised symbolic product of measurement, interpretation, and consensus.

The phrase “binding” is not the full biochemical interaction. The phrase “black-hole merger” is not the interferometric measurement. Both are symbolic compressions. Both are useful. Both require caution.

## *Semantic Coupling*

The task is therefore not to abolish scientific nouns, but to keep their provenance visible. In the end, the issue is not merely whether a model works. The deeper issue is how a dynamic interaction becomes a fixed symbol, how that symbol becomes coupled to observation, and how the resulting narrative gains the appearance of direct knowledge. That is the shared structure, the critique, and trajectory of this essay.