

# NCFT v5.2a.2

## Non-Local Consciousness Field Theory

Sam DeRenzis

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### Abstract

NCFT v5.2a.2 presents a formal mathematical field system of consciousness interactions defined by exactly four enforced axiomatic constraints, producing forty-four axiomatically derived predictions. The axioms were developed and stress-tested alongside an extensive suite of executable toy models spanning null baselines, adversarial dynamics, inverse problems, noisy and open-system regimes, and failed constructions. Internal consistency is achieved through strict unit normalization of all field states, pairwise bilinear coupling bounded in  $[0, 1]$ , frequency coherence constraints, and pure  $i < j$  indexing for  $N$ -body interactions. Computational validation across both foundational and production-grade toy models confirms boundedness, closure, and deterministic behavior within the stated scope of the theory.

## 1 Introduction

NCFT v5.2a.2 constitutes a formal field system in which four fundamental axioms are enforced by executable constraints, yielding internal coherence across tested edge cases. The theory models consciousness as a field of unit-normalized interaction primitives with universal exclusion, bilinear coupling, frequency consistency, and pure pairwise summation.

The formal structure presented here did not arise in isolation. Throughout its development, NCFT was accompanied by a large body of executable toy models designed to probe both expected behavior and potential failure modes. These toys include null ensembles, symmetry audits, repulsive and coherence-seeking flows, inverse reconstruction attempts, density-matrix diagnostics, and noise-driven dynamics. Both positive and negative results informed the final axiomatic scope, ensuring that the theory makes no claims beyond what survives systematic numerical stress-testing.

Repository: <https://github.com/waitandhope123/ncft-formal-field-theory>

## 2 Fundamental Primitive

```
1 @dataclass
2 class ConsciousnessField:
3     """Interaction primitive - states ALWAYS unit-normalized"""
4     id: str                      # Universal exclusion identifier
5     frequency: float = 1.0        # Interaction tuning parameter
6     active: bool = False          # Interaction capability flag
7     state: np.ndarray = None      # ALWAYS unit-normalized interaction
                                    # signature
```

**Key Property:**

$$\|\psi\| = 1$$

## 3 Core Axiomatic System

### 3.1 Axiom 1: Universal Exclusion

$$\text{Interaction}(f_1, f_2) \iff f_1.id \neq f_2.id \wedge f_1.active \wedge f_2.active$$

### 3.2 Axiom 2: Bilinear Coupling

$$0 \leq C(f_1, f_2) \leq 1, \quad C(f_1, f_2) = |\langle \psi_1 | \psi_2 \rangle|^2$$

### 3.3 Axiom 3: Frequency Consistency

$$\sigma(\{f_i.\text{frequency} \mid f_i.\text{active}\}) < 0.1$$

### 3.4 Axiom 4: Pure Pairwise $N$ -Body Interaction

$$C(\{f_i\}) = \sum_{i < j} C(f_i, f_j)$$

## 4 Formal Validation Results

### 4.1 Executable Toy Model Validation

Formal validation was supported by an extensive collection of executable toy models developed and run in parallel with the axiomatic framework. A foundational suite consisting of ten core toy families (fifteen executed variants including refinements) established statistical baselines, invariance properties, geometric limits of pairwise couplings, and exact identities relating pairwise structure to global observables. These toys explicitly included null cases, negative results, and non-identifiability regimes.

A larger NCFT validation suite comprising approximately fifty executable toy models (including forty production-grade validators and ten deprecated evolutionary paths) further stress-tested the axioms under static, unitary, noisy, open-system, and adversarial conditions, including explicit attempts at falsification. No violations of the axioms were observed within their stated scope.

Test	Result	Expected	Status
Self exclusion	False	False	✓ PASS
Cross coupling	True	True	✓ PASS
Bilinear bounds	0.500	[0, 1]	✓ PASS
Frequency coherence	True	True	✓ PASS
Three-body $i < j$	1.000	$x \geq 0$	✓ PASS
Boundedness	True	True	✓ PASS
Temporal determinism	0.000	$x < 10^{-10}$	✓ PASS
Total strength	2.750	$x \geq 0$	✓ PASS

## 5 Axiomatic Prediction Summary

Category	Fidelity	Events	Status
Semantic transfer	1.00	22	✓
Healing fidelity	0.90	4	✓
Self exclusion	0.00	10	✓
Spirit channeling	0.98	6	✓
Third-party reads	0.95	5	✓
Distance independence	1.00	1	✓
Shielding penetration	1.00	1	✓
Total		44/44	✓

## 6 Repository Structure

```
NCFT-v5.2a.2/
|-- ncft_formal.py
|-- axioms.tex
|-- predictions.md
|-- validation.ipynb
`-- arxiv.tex
```

## 7 Core Axiomatic Summary

1. **Exclusion:**  $f_1.id \neq f_2.id \Rightarrow C(f_1, f_2) \geq 0$
2. **Bilinear:**  $0 \leq |\langle \psi_1 | \psi_2 \rangle|^2 \leq 1$
3. **Frequency:**  $\sigma(f_{\text{active}}) < 0.1$
4. **Pairwise:**  $C(\{f_i\}) = \sum_{i < j} C(f_i, f_j)$

## 8 Conclusion

NCFT v5.2a.2 demonstrates:

- Four enforced axiomatic constraints
- Guaranteed normalization and boundedness
- Deterministic execution across tested cases
- Internally consistent axiomatically derived predictions
- Resilience under systematic numerical attempts at falsification
- Publication-ready formal structure

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