PEACE: Paraconsistent Epistemic And Contextual Evaluation

A Framework for Resolving Formal Paradoxes Through Context Restoration

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Abstract

We present PEACE (Paraconsistent Epistemic And Contextual Evaluation), a three-valued logical framework that resolves classical paradoxes and intractable problems by recognizing them as artifacts of artificial decontextualization. Rather than seeking solutions within formal systems that strip away essential context, PEACE treats ambiguity as an information state that can be resolved through context discovery. We demonstrate that problems ranging from the Liar Paradox to P vs NP become tractable when sufficient contextual information is restored, suggesting that many "unsolvable" problems in logic, mathematics, and computer science are not fundamental mysteries but consequences of over-formalization.

1 Introduction

Classical logic demands that every proposition be either true or false. When we encounter statements that resist this binary classification—such as "This statement is false"—we declare them paradoxes and spend centuries debating their resolution. Similarly, computational complexity theory asks whether problems can be solved efficiently in abstract computational models, leading to questions like P vs NP that have resisted resolution for decades.

We propose that these persistent difficulties share a common cause: the artificial removal of contextual information that would make the problems naturally solvable. By formalizing real-world situations into context-free abstract systems, we inadvertently create what Descartes called the "evil demon" scenario—we have the symbols but not their meaning.

This paper introduces PEACE (Paraconsistent Epistemic And Contextual Evaluation), a framework that treats apparent paradoxes and intractable problems as information problems rather than fundamental logical impossibilities.

2 The Context Stripping Problem

2.1 How Formalization Creates Paradoxes

Consider the classic Liar Paradox: "This statement is false." In isolation, this creates an infinite logical loop. But this paradox only exists because we have artificially stripped away the contextual information that would resolve it.

In real conversation, such statements always have context:

- 'This statement is false" (said immediately after 'I should have known better")
- 'This statement is false," he said with a smile
- 'This statement is false," she replied, looking confused

With even minimal context restored, the apparent paradox dissolves trivially. The speaker is referring to their previous statement, expressing irony, or indicating confusion—all perfectly comprehensible speech acts.

2.2 The Cartesian Demon Connection

Descartes' evil demon thought experiment asked: what if all our sensory experiences were illusions fed to us by a malicious entity? How could we have certain knowledge?

Formal systems create exactly this scenario. By systematically removing contextual information—what statements refer to, how problems were generated, why they have particular structures—we place ourselves in an artificial epistemic poverty where resolution becomes impossible by design.

We have created our own demons, then spent centuries trying to prove they don't exist.

3 The PEACE Framework

3.1 Three-Valued Logic Structure

PEACE employs a three-valued logical system:

1. **Both** (Default state): Insufficient contextual information exists to determine truth value
2. **True**: Sufficient context has been discovered to warrant truth assignment
3. **False**: Sufficient context has been discovered to warrant falsehood assignment

Critically, there is no 'Neither" value. The framework assumes that truth exists but may require contextual information to access it. Apparent 'undecidability" reflects our epistemic limitations, not ontological indeterminacy.

3.2 Context Discovery Process

The PEACE resolution process follows these steps:

1. **Initial Assignment**: All ambiguous statements begin in the 'Both" state
2. **Context Gathering**: Collect information about what terms refer to, how problems were generated, what relationships exist
3. **Progressive Resolution**: As contextual information accumulates, problems move from 'Both" to 'True" or 'False"
4. **Confidence Tracking**: Maintain quantified measures of epistemic certainty based on context sufficiency

4 Applications to Classical Problems

4.1 The Liar Paradox

Classical Formulation: "This statement is false"
PEACE Analysis:

- Initial state: Both (insufficient context about referent)
- Context discovery: What does "this statement" refer to?
- Resolution: With minimal contextual information, becomes straightforwardly true or false

The "paradox" exists only in the artificially decontextualized formal version.

4.2 The Goldbach Conjecture

Classical Formulation: Every even integer greater than 2 can be expressed as the sum of two primes
PEACE Analysis:

- Initial state: Both (insufficient computational verification across all even numbers)
- Context discovery: Examine empirical patterns, heuristic predictions, and their agreement
- Resolution: High epistemic confidence based on consistent pattern matching across large scales

Rather than demanding impossible complete verification, PEACE builds confidence through accumulated evidence and pattern consistency.

5 Applications to Computational Problems

5.1 RSA and Integer Factorization

Classical View: Integer factorization requires exponential time
PEACE Analysis:

- The problem is not inherently hard—it lacks contextual information
- With knowledge of factors or generation methods, factorization becomes trivial
- "Hardness" reflects epistemic state, not mathematical impossibility

5.2 P vs NP

Classical Formulation: Does P equal NP?
PEACE Analysis:

- The question may be conceptually flawed by decontextualization
- Real algorithmic discovery requires sufficient information about problem structure
- We need algorithm-finding algorithms, which themselves require contextual information
- This creates a potentially infinite regression that classical complexity theory cannot handle
- The "hardness" lies in information discovery, not computational impossibility

The P vs NP question, stripped of context about how algorithms are actually discovered, becomes unanswerable in the same way as the Liar Paradox.

6 Broader Implications

6.1 The Pattern Across Disciplines

PEACE reveals a consistent pattern across seemingly unrelated "unsolvable" problems:

- **Philosophy**: The Trolley Problem becomes answerable with specific relationships and circumstances
- **Logic**: Paradoxes dissolve with minimal referential context
- **Mathematics**: Conjectures become decidable through empirical pattern analysis
- **Computer Science**: Complexity questions become tractable with structural information
- **Existential Questions**: "The meaning of life" requires personal and cultural context

6.2 The Formalization Trap

Academic disciplines have created elaborate formal systems that systematically remove the contextual information needed for problem resolution. We then mistake our inability to solve decontextualized problems for profound insights into the nature of reality.

This suggests that many "deep" problems in philosophy, mathematics, and computer science are artifacts of over-formalization rather than genuine mysteries.

7 Limitations and Clarifications

7.1 What PEACE Does Not Claim

PEACE does not claim to "solve" these problems within their original formal systems. Instead, it demonstrates that:

- The formal systems themselves are artificially impoverished
- Context restoration dissolves apparent paradoxes naturally
- Epistemic confidence can be quantified without absolute proof
- Many persistent problems result from methodological choices, not deep truths

7.2 Scope of Application

PEACE applies to problems where:

- Essential contextual information has been artificially removed
- Apparent paradoxes arise from referential ambiguity
- "Hardness" may reflect epistemic rather than ontological factors
- Progressive context discovery is possible

8 Conclusion

The PEACE framework suggests that centuries of effort spent on "unsolvable" problems may have been misdirected. Rather than seeking solutions within formal systems that strip away essential context, we should focus on context restoration and epistemic confidence building.

This represents a fundamental shift from asking 'Is this statement true or false?" to asking 'What contextual information would make this statement's truth value accessible?"

Many problems that have resisted solution for decades or centuries may dissolve naturally once we stop artificially impoverishing them of the contextual information that makes them solvable.

The implications extend beyond academic philosophy and theoretical computer science. PEACE suggests a general methodology for approaching apparently intractable problems: instead of working harder within formal constraints, step back and ask what essential context has been removed.

In doing so, we may find that we have been creating our own demons—and that peace comes not from slaying them, but from recognizing that they were illusions born of unnecessary abstraction.

Acknowledgments

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