

Civilization Causality Theory: The Third Causal System and Minimal Handshake Protocols

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Abstract

This paper develops a core instrumental component of **Civilization Causality Theory (CCT)**: the **Third Causal System (TCS)** and the necessity of **Minimal Handshake Protocols** for any form of cross-civilizational interaction.

We argue that independently evolved civilizations, when modeled as autonomous causal systems, cannot interact directly in a meaningful or stable way. Any apparent communication must instead be mediated through a **neutral, jointly evolved causal substrate**. This substrate—TCS—is not a language, protocol, or technology, but a minimal causal environment in which shared structure can emerge.

The paper focuses on structural requirements rather than implementation details. It introduces the concept of *minimal handshake*, analyzes its constraints, and explains why such handshakes cannot be transmitted or predefined, but must be co-evolved.

This work deliberately excludes empirical speculation or observational interpretation. It is intended as a **tool paper**, providing structural foundations for later theoretical and applied work.

1. Introduction

Civilization Causality Theory models civilizations as **self-consistent causal systems**: systems whose internal states evolve according to their own causal rules and generate meaning only within that structure. Under this definition, civilizations that evolve independently do not merely differ in language, culture, or technology. They differ at the level of **causal grounding**. Their internal variables, transitions, abstractions, and semantics arise from distinct evolutionary histories and cannot be assumed to share any alignable substrate. This paper addresses a fundamental question that follows: *If civilizations are autonomous causal systems, how can any interaction between them occur at all?* We show that **direct interaction is structurally impossible**, and that any feasible interaction requires the construction of a **Third Causal System (TCS)**—a neutral causal environment jointly shaped by both parties.

2. Why Cross-Civilizational Interaction Cannot Be Direct

2.1 Civilizations as closed causal systems

A civilization preserves coherence by enforcing internal causal consistency, within which signals, symbols, and actions derive meaning exclusively from their position in the internal causal structure. Meaningful interpretation of an external signal would therefore require the receiving system to align the signal with its internal variables, embed it within existing causal transitions, and confirm its consistency through internal feedback mechanisms. In the case of independently evolved civilizations, there is no structural basis to assume that any of these requirements can be satisfied.

2.2 The impossibility of semantic bootstrapping

Absent shared primitives, semantic interpretation is intrinsically underdetermined. Any signal may correspond to multiple internal interpretations, none of which can be privileged without an external criterion of validity. This ambiguity is structural rather than epistemic.

Learning does not circumvent this constraint. Learning mechanisms require error signals, feedback coupling, and a stable reference frame to support convergence. Independently evolved civilizations lack these conditions in common, and signaling alone cannot establish them. As a result, semantic alignment cannot emerge through iterative interpretation or learning in the absence of a shared causal foundation.

3. The Necessity of a Third Causal System (TCS)

3.1 Definition

A Third Causal System (TCS) is a causal environment external to both civilizations, yet accessible to each through observation and intervention. It evolves according to rules that are not semantically or structurally privileged to either side, thereby preventing unilateral interpretation or control.

A TCS is not a protocol, message, or encoding mechanism. It does not transmit meaning between systems. Rather, it provides a neutral causal substrate in which interaction can take place without assuming shared semantics. Any apparent coordination or interpretability must arise from joint engagement with the system's dynamics, not from information exchange imposed by one civilization onto the other.

3.2 Structural role of TCS

TCS serves three essential functions:

1. **Causal anchoring** Both civilizations can observe the same state changes.
2. **Bidirectional influence** Both can act upon the system and see the effects.
3. **Semantic emergence** Meaning arises from consistent causal interactions within the TCS, not from pre-existing symbols.

Without such a system, there is no space in which mutual interpretation can stabilize.

4. Constraints on the Third Causal System

For a TCS to function, it must satisfy strict structural constraints.

4.1 Non-semantic

TCS cannot embed meanings, symbols, or concepts from either civilization. Any semantic assumption would immediately bias interpretation and collapse neutrality.

4.2 Non-cultural

No norms, goals, values, or intentions may be presupposed. Cultural content must emerge, not be encoded.

4.3 Non-technological

TCS cannot depend on shared technology stacks, physics models, or engineering assumptions. Its accessibility must be defined purely in causal terms.

These constraints imply that TCS must begin at an **extremely low informational density**, relying only on minimal, universally observable causal regularities.

5. Minimal Handshake: Concept and Purpose

5.1 What is a Minimal Handshake?

A Minimal Handshake is the lower bound of causal interaction required to demonstrate mutual observability and responsiveness between two civilizations under conditions of maximal uncertainty. It is constrained to interactions that do not presuppose shared semantics, intentions, or trust, and therefore remains compatible with non-hostile coexistence.

The handshake itself does not transmit information. It establishes only the existence of a stable causal coupling through which information might later become possible. In this sense, a Minimal Handshake is not communicative but permissive: it does not say anything, but it makes saying something structurally feasible.

5.2 Why minimality is required

Initial interactions between independently evolved civilizations occur under conditions of maximal uncertainty. Any interaction that exceeds minimal causal complexity introduces irreversibility: once interpreted as intent, threat, or commitment, its consequences cannot be reliably undone. Without shared semantics or feedback mechanisms, escalation becomes structurally irreversible rather than strategically avoidable.

Minimality constrains interaction to reversible causal effects only. It prevents the encoding of intent, avoids premature commitments, and guarantees that disengagement remains a valid option throughout the interaction. In this sense, minimality is not a design preference but a structural requirement for stability under causal incompatibility.

6. Structural Properties of Minimal Handshake Protocols

6.1 Initial conditions

A minimal handshake must be designed to operate under conditions of maximal uncertainty. At the point of first contact, no assumptions can be made regarding the perceptual modalities, physical scale, energy representations, or internal architectures of the interacting civilizations. Any such assumptions would implicitly privilege one causal system over the other and introduce hidden asymmetries at the outset.

The only admissible assumption is causal responsiveness itself: that the external system is capable of responding to changes in a shared causal environment. This assumption does not rely on semantics, shared representation, or technological similarity. It merely presupposes that actions within the Third Causal System can, in principle, produce observable effects that are not strictly random. All other forms of prior knowledge are structurally unavailable and therefore excluded.

6.2 Asymmetric risk minimization

A minimal handshake must remain safe even under extreme asymmetry of understanding. It must not rely on the assumption that both parties interpret the interaction correctly, or even that both recognize it as an interaction at all. Any action performed within the handshake must therefore remain non-threatening and reversible under all plausible interpretations.

This requirement imposes strict structural constraints. Actions that could be interpreted as directed force, irreversible state changes, or high-complexity signaling patterns are excluded, not because they are technologically difficult, but because their consequences cannot be reliably bounded across incompatible causal systems. The handshake must be robust against worst-case interpretations, including the possibility that only one side perceives causal structure while the other does not.

Risk minimization, in this context, is not a strategic choice but a structural necessity. Without it, initial interaction would collapse into uncontrolled escalation driven by irreversibility rather than intent.

6.3 No intent encoding

Intent cannot be encoded directly within a minimal handshake. Any attempt to signal purpose, meaning, or goal presupposes a shared interpretive framework, which is precisely what does not exist at this stage. Direct intent signaling

therefore introduces ambiguity rather than clarity and increases the likelihood of misclassification.

Instead, intent—if it is to be inferred at all—can only emerge indirectly through observable patterns over time. Repetition without escalation, restraint in the presence of opportunity, and consistent responsiveness to external changes provide the only structurally admissible basis for inference. These patterns do not communicate intent explicitly; they constrain the space of possible interpretations.

By eliminating direct intent encoding, the handshake prevents exploratory behavior from being prematurely classified as hostile action. It preserves ambiguity where ambiguity is unavoidable and delays semantic interpretation until a shared causal substrate has begun to stabilize.

7. Why Protocols Cannot Be Sent

7.1 The failure of transmission

A protocol, by definition, presupposes conditions that do not exist prior to first contact. For a protocol to be transmitted and interpreted, there must already be shared assumptions about meaning, expectations regarding behavior, and an agreed framework for interpretation. These prerequisites are not auxiliary conveniences; they are structural dependencies.

In the context of independently evolved civilizations, none of these dependencies are available. Any signal intended to convey a protocol must itself be interpreted through the receiver's internal causal structure. Without shared semantics or reference frames, the same signal can be mapped to arbitrarily many interpretations, none of which can be validated as correct. Transmission therefore fails not because of noise or insufficient bandwidth, but because interpretation itself is underdetermined.

Attempting to send a protocol thus creates a circular dependency. The sender assumes the existence of alignment in order to transmit instructions whose purpose is to establish alignment. This circularity cannot be resolved by adding redundancy, complexity, or intelligence. It is a structural impossibility, not a technical limitation.

7.2 Co-evolution as the only solution

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8. Implications

The existence of a Third Causal System and the necessity of minimal handshake protocols impose strict constraints on the nature of cross-civilizational interaction. Direct communication between independently evolved civilizations is not merely difficult or unlikely; it is structurally impossible. Any attempt at interaction that bypasses a neutral causal medium presupposes semantic alignment that cannot exist prior to contact.

As a result, all meaningful interaction must occur within a shared causal environment that is external to both civilizations. This environment does not transmit meaning but enables the gradual emergence of mutual responsiveness through observable causal effects. Early-stage contact therefore cannot carry semantic content, intentions, or cultural

signals. What it can establish, at most, is the existence of another responsive system operating under compatible causal constraints.

Civilization-level interaction thus begins with structure rather than information. Before messages, symbols, or semantics can arise, there must first be a jointly accessible causal substrate in which interaction can stabilize. These conclusions follow directly from causal considerations and do not depend on assumptions about biology, technology, intelligence levels, or astrophysical context. They apply equally to any system that qualifies as an autonomous civilization in the causal sense defined by this theory.

9. Conclusion

This paper establishes the structural necessity of a Third Causal System and minimal handshake protocols as prerequisites for any form of cross-civilizational interaction. The argument is derived entirely from causal considerations and does not rely on speculative assumptions about technology, biology, intelligence magnitude, or astrophysical behavior. Its central contribution is to show that the earliest phase of inter-civilizational contact cannot be semantic, intentional, or informational, but must instead be structural and process-based.

The framework presented here does not propose a specific implementation, signal design, or detection strategy. It does not attempt to explain particular observational phenomena, nor does it claim to predict empirical signatures of contact. Such applications, if pursued, necessarily depend on contingent physical and technological contexts that lie outside the scope of this work.

Instead, the purpose of this paper is foundational. It delineates what cannot work prior to contact and clarifies the minimal conditions under which interaction can even begin. By doing so, it provides a structural filter for evaluating existing proposals and a constraint framework within which future models may be developed.

Further work may extend this framework toward formalization, simulation, or domain-specific instantiation. However, any such extension must preserve the core causal asymmetries and minimality constraints identified here. The Third Causal System is not an optional design choice but a structural requirement. Likewise, the minimal handshake is not a communication protocol in the conventional sense, but the only viable process through which mutual recognizability can emerge between causally incompatible civilizations.