Understanding Understanding

Traces, Interruptions, and Contextual Stabilizations

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entry point into the evolving project

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Abstract

This document is a compact, humanly checked entry point into an evolving research project on understanding, representation and formalization. It asks how structures of meaning can emerge from partial traces and local attempts at reconstruction before a common formal language has been fixed.

The project starts from a simple observation: traces can be transmitted, observed, interrupted and reconstructed, but an interruption need not determine a unique continuation. What is reconstructed need not be what was there before the interruption. An understanding is therefore treated operationally as a locally stable way of distinguishing and continuing a construction, rather than as an absolute identification of an underlying object.

A central methodological choice is to interrupt premature completion. Instead of silently filling a missing part with one preferred structure, the project keeps several compatible reconstructions visible and asks how they can be compared, connected, or anchored. This also means trying to understand a distinction before deciding how to formalize it: the formal frame is itself part of what may need to be examined, revisited, or reconstructed.

This has led to a deliberately plural language of traces, gestures, orientations, roles, representations, repetitions, interruptions and partial formalizations. The project does not currently seek one final theory. Different formalizations may stabilize different aspects of a construction, while also making some distinctions easier to see and others harder to express. The resulting branches are not necessarily competing theories: they are experiments in what becomes distinguishable, reproducible or computable under different constraints.

1 A question before a theory

The project originates in an exploratory research process concerning understanding, representation, communication and formalization.

> How can structures of meaning emerge from partial traces and local attempts at reconstruction, before a common formal language has been fixed?

A formal language does not merely describe an already given world. When we choose primitives, types, coordinates, axioms or inference rules, we also choose which distinctions and transformations will be available. Formalization is therefore itself a form of stabilization.

The project explores a complementary direction: start from constructions that can be perceived, manipulated, interrupted and interpreted, and ask which parts of them can subsequently be anchored in mathematics.

$$\boxed{\text{construction} \longrightarrow \text{possible formalization} \longrightarrow \text{new distinctions}}$$

The first arrow is not a universal algorithm. It describes a research attitude: constructions may precede the formal framework in which some of them will eventually become precise.

2 A trace before its formalization

A trace is something that can be transmitted, observed again, transformed, interrupted, or reconstructed. It need not initially possess a prescribed geometry, algebraic structure or semantic interpretation.

A possible trajectory is

$$\text{trace} \longrightarrow \text{interruption} \longrightarrow \text{attempted reconstruction} \longrightarrow \text{stabilization}.$$

But this arrow is not a fixed procedure. An interruption does not necessarily determine a unique continuation. Different observers, or the same observer after different histories of observation, may construct different continuations that remain compatible with the trace available to them.

What is reconstructed need not be what was there before the interruption.

A reconstruction is nevertheless constrained by the trace, accumulated expectations, available operations, and what can subsequently be reproduced or communicated.

3 Interruption rather than premature completion

Suppose a trace suggests several possible continuations. A conventional formalization may choose one by introducing additional structure, axioms or conventions. Here one can instead ask what remains available while the continuation is left open:

$$\boxed{\text{partial trace} \overset{\text{interrupt}}{\longrightarrow} \text{compatible reconstructions}}$$

rather than

$$\text{partial trace} \longrightarrow \text{chosen completion}.$$

The interruption delays a choice without forbidding it. Once several choices have been made, they can themselves become objects of comparison.

Repeated interruption can therefore be constructive: it may reveal which features persist across reconstructions and which depended on a particular completion.

4 Understanding as local stabilization

Understanding is used here in an operational sense. An interpretation counts as an understanding when it becomes stable enough to be reproduced, communicated, or used to continue a construction. This does not imply that it is globally correct:

$$\text{understanding} \neq \text{absolute identification}.$$

Rather,

$$\boxed{\text{understanding} \sim \text{a locally reproducible way of distinguishing and continuing a construction.}}$$

The word “locally” is essential. A stabilization may work for one observer, community, language, task or mode of observation, and later fail under another interruption.

The question consequently becomes not only “what is the object?” but also: what distinctions can be maintained, communicated and acted upon here?

5 The point as an achievement

A recurring temptation in formalization is to begin with points. Points are useful: they are precise, manipulable and easy to place in a common mathematical space. But their usefulness can conceal the work required for several observers to treat something as the same point.

The project therefore experiments with a weaker starting intuition:

> What we call a point may be a local stabilization among contextual views that have become sufficiently compatible.

This is not a rejection of points or geometry. It is a reminder that the ideal point is an ideal construction. A point can be extremely effective once the context has been fixed. The project asks what happened before that fixing, and what becomes visible if the stabilization is interrupted.

In this sense, a point may be understood less as the primitive from which relations emerge than as something that can emerge from relations. The same question applies to boundaries, common objects, names and other apparently elementary entities.

6 A forest rather than a single tree

The project repeatedly produces several mathematical or conceptual continuations from the same construction. This proliferation is not treated simply as a defect of an incomplete theory. A construction may give rise to several directions:

$$M \longrightarrow M_1,\ M_2,\ M_3,\ M_4, \ldots$$

The task is not necessarily to decide immediately which branch is "the real" one. It is to explore relations between branches: inclusion, translation, duality, approximation, specialization, compatibility, incompatibility, or perhaps no useful relation at all.

The resulting structure is therefore better imagined as a forest of interpretations than as a single tree whose branches all descend from one privileged root.

The order in which branches are explored is an order of research, not an ontological ranking. One branch may be explored first because it illuminates another, without thereby becoming the origin or destination of the others.

7 Gestures, orientations and representations

Before being encoded as algebraic operations, some constructions are described through gestures. A direction can be read as a continuation. A boundary can be read as a separation. A repeated mark can be read as persistence. A change of orientation can be read as a transformation. A missing continuation can remain an interruption.

Pictures and gestures are not intended to replace mathematics. They can preserve distinctions that a premature symbolic contraction would erase.

A trace may admit several visually compatible regularizations: one reading may expose arrows, another boundaries or walls, another sequential order, another spatial aggregation. These readings need not be derived from one another. They may be different reconstructions of a partially undefined source.

> Several formalizable structures may be reconstructions of one construction without one of them being its unique prior meaning.

This is why intermediate diagrams and assemblages remain visible: they record stabilizations that may later become useful from another direction.

8 The provisional roles q, d, p, b

The symbols q, d, p, b recur in the constructions. Their meaning is deliberately not fixed independently of the gestures, orientations and processes in which they occur. They are not currently presented as the axioms of a new mathematical system, but as a vocabulary for recurring distinctions.

One possible reading is:

- q can mark a direction of continuation or activation;
- d can mark a distinction, description or local stabilization;
- p can mark a partition, passage or persistence of a partially completed trace;
- b can mark a boundary, bearing or unresolved configuration.

The precise interpretation may vary with the construction. This instability is deliberate. A later formalization may show that some uses can be unified while others must remain distinct.

The roles should therefore not automatically be read as fixed types. The same participant or construction may occupy different roles relative to different processes or contexts.

Anthropomorphism can be used as a deliberate construction: attributing intention to an observed part may help make otherwise invisible relations of agency explicit. This attribution need not be taken as a claim about an intrinsic intention. It can instead preserve an interlocutor in the description, making it possible to maintain a link through which response, ethics and responsibility remain meaningful.

9 Two directions of distinguishability and instantiability

The constructions repeatedly distinguish two questions:

1. what can be distinguished by an observer?
2. what can be instantiated as a reproducible process?

They should not be collapsed prematurely. A distinction may be perceptible without yet being available as a stable operation. Conversely, a process may be formally reproducible while the distinctions through which it was originally understood remain richer than its formal representation.

The project therefore explores the space between distinguishability and instantiability. Interruption is one way of keeping this space visible. The aim is not to preserve a binary opposition, but the possibility of a second cut: after a first distinction has been made, what additional distinction becomes possible by examining the relation between the two directions?

10 Formalization as an anchoring

The project does not oppose informal construction and formal mathematics. Instead, it treats formalization as an *anchoring* of a construction within a particular framework.

A construction may be anchored in graph theory, automata theory, algebra, category theory, logic, quantum information, or another formal setting.

Such an anchoring can provide powerful tools:

- definitions become precise;
- transformations can be composed;
- compatibility can be tested;
- invariants can be identified;
- conjectures can become theorems;
- computations can explore finite instances.

But anchoring also has a cost. It makes some distinctions precise while leaving others unresolved, invisible or inexpressible within the chosen framework.

> A formalization is interesting both for what it stabilizes and for what it makes impossible to express.

Different formal frameworks can therefore be used as experiments on an evolving construction rather than as competing candidates for one true formalization.

11 Partial formalizations

A construction can become mathematically productive before it becomes mathematically closed. A graph, automaton, algebraic operation or categorical construction may capture a particular region of the process.

The interest lies not only in proving results inside that region, but also in asking which distinctions became available through the anchoring and which remain dependent on other readings.

A formal attempt that does not provide the expected unification may still be valuable if it shows that two apparently similar constructions behave differently, or that a framework silently introduced a distinction absent from the original construction.

$$\text{construction} \to \text{anchoring} \to \text{new distinction} \to \text{reconstruction}.$$

The next formalization can begin from what the previous one made visible.

12 Dynamic and computational perspectives

The approach naturally leads toward dynamic models. Instead of representing only a final state, one can represent sequences of partial observations, interruptions, reconstructions and stabilizations.

This makes automata and related computational structures natural candidates. The Master's work on Dynamic Automata provides one concrete example of such an anchoring: a portion of the broader exploratory language can be isolated and turned into a computational object without requiring the whole construction to have already been formalized.

This is precisely the kind of partial formalization the project seeks. The point is not that automata are the final language of understanding, but that they can test what happens when some dynamic distinctions are made explicit and reproducible.

13 Quantum information and contextuality

The same perspective connects naturally with quantum information. Quantum contextuality already makes explicit that descriptions cannot always be assembled into one context-independent global assignment.

The present project asks whether some of the intuitions behind such phenomena can be approached more dynamically:

> What happens when the relevant description itself is partial, evolving and subject to interruption?

This is not proposed as a new theory of contextuality. Quantum information provides a demanding mathematical and physical setting in which traces, local interpretations and compatibility can be tested.

14 From stability to compatibility

A recent direction of the project concerns what allows different local stabilizations to coexist. Suppose two observers reconstruct a partial trace in different ways:

$$I_A(T) \neq I_B(T).$$

The difference need not immediately mean that one reconstruction is wrong. The question may instead be whether the two reconstructions can support a common continuation:

$$I_A(T) \;\mathsf{R}\; I_B(T).$$

Here R is not yet a fixed mathematical relation. It marks a research question: what should count as sufficient compatibility for two local constructions to continue interacting?

This suggests a possible direction:

$$\boxed{\text{trace} \to \text{local interpretation} \to \text{comparison} \to \text{compatibility} \to \text{further construction.}}$$

The project does not yet claim a definitive metric, probability or algebra for such compatibility.

15 An anchor and the waves

There is also a more ordinary question underneath the formal one: how does one begin when one does not yet know where one is going?

An anchor suggests stability, but an anchor is useful only in relation to something that moves.

One can think of the project as learning to remain with partial knowledge without turning uncertainty immediately into a defect:

> Nager, c'est quelque part échouer à marcher sur l'eau.

The image is not a theory. It expresses a methodological preference: one may continue with doubts, alongside those who hold certainties, those who do not yet find them, and those who are still recovering their breath.

The project does not seek to abolish uncertainty before construction begins. It asks whether uncertainty can itself become a condition for discovering distinctions.

16 What remains deliberately open

Several questions remain unresolved:

- Which constructions admit useful formalizations?
- Which apparent symmetries are genuine structures and which are consequences of a chosen reading?
- When can several local reconstructions be shown compatible?
- Can interruption delay a choice without merely replacing it by another hidden convention?
- Which mathematical frameworks best preserve the distinctions present in the original constructions?
- What new mathematical phenomena become visible when formalization is deliberately partial?
- Can relations between different formal anchors be characterized without forcing them into one common formal language?
- What would count as "sufficiently" formalized for a construction to become reproducible without pretending that its other possible readings have disappeared?

These are not gaps to be hidden by premature definitions. They are part of the research program.

17 Conclusion: a way into an evolving forest

This document should be read neither as a finished theory nor as a collection of unrelated metaphors. It is an attempt to construct a language in which mathematical formalization can happen progressively, locally, and in several possible directions.

One possible trajectory is

$$\boxed{\text{trace} \to \text{interruption} \to \text{reconstruction} \to \text{stabilization} \to \text{formal anchoring.}}$$

But this is only one possible reading, not a prescribed order of formation.

The project is increasingly less well described by a single tree of derivations than by a forest of constructions and interpretations. The point is not to extract a single structure from this forest, nor to decide in advance which branches should survive. *Interrupting interruptions* offers instead a way of visiting such dynamic structures, one direction at a time, while comparing what stabilizes locally and what changes when another direction is explored.

The point, the boundary, the name, the role, the representation and even the formal language may all be useful achievements of stabilization rather than unquestioned primitives.

The aim is not to reject rigor, but to let perception, gesture, partial knowledge, reconstruction and contextual agreement remain visible long enough to become mathematically productive.

This text is an evolving entry point into a larger research notebook.

Note on the writing process

This document is part of an evolving research notebook. Some formulations have been developed and refined through interactive dialogue tools used as exploratory aids. Such tools are treated as instruments for construction and reformulation, not as sources of mathematical authority. The responsibility for the content and its interpretation remains entirely the author's.