Codynamic Theory of Mind

A Constructive Framework for Conscious Experience

Arthur Petron — May 2025

Abstract

This article presents the *Codynamic Theory of Mind*—a rigorous and intuitively grounded model of mind as an evolving, structure-refining, reflexive system. It is not a metaphorical account but a mathematically constructive one, rooted in lived experience and formalized through a unique architecture of observers, perspectives, gluing operations, and recursive self-modeling.

0. Invitation: You Are Already Inside It

Take a breath.

You are reading—more than that, you are interpreting. As you interpret, you build structure. That structure changes you. This is not metaphor. This is what mind is.

The Codynamic Theory of Mind begins with this: a mind is not something that happens in a container called a brain—it is the evolving process of building and restructuring that container in response to the very world it models.

This document is not about minds from the outside. It is a theory *from inside*. It invites you to notice how you're changing as you engage with it.

1. On the Word *Codynamic*

codynamic (*adj.*, coined by the author): Describing a system in which the observer and the observed evolve together, such that the structure generating thought is continuously reshaped by the thought it generates.

Why make up a word? Because no existing term quite captures the central intuition this theory demands.

"Dynamic" is too flat. "Interactive" too passive. "Cybernetic" too mechanical. The mind is none of these—it is *codynamic*. The term fuses co- (together, mutually) and dynamic (of change and force). It names the recursive, lived process by which minds continuously reconstitute themselves.

Codynamic is not jargon. It is an offering: a label for the thing you already are.

2. Phenomenological Grounding: What Mind Feels Like

Before we define anything formally, we pause to acknowledge the reality we already inhabit.

- Memories that change each time you recall them.
- Beliefs that restructure the meaning of your past.
- The sudden click of insight.

These are not quirks—they are the texture of what being a mind is. They show that mind is not a container of facts. It is a recursive, layered, model-building process in which everything you know can reconfigure itself.

If your mind weren't codynamic, you wouldn't be here.

3. The Codynamic Premise

What, then, does it mean to say that a mind is codynamic? Here we move from lived intuition to theoretical stance.

The central premise is this:

> ***A mind is an evolving system whose structure of perception, modeling, and action changes as a result of its own activity.***

To be codynamic is not simply to change—it is to evolve within a feedback geometry, where each internal state constrains the next possible ways of understanding. A codynamic mind is not an actor on a stage—it is the stage folding in on itself.

3.1 Core Ontological Commitments

- **Minds are not static objects.** They cannot be fully specified without modeling their evolution.
- **Every state of mind is also a rule for transitioning to new states.** These transitions are part of what the mind must model.
- **Mind is inherently self-modeling.** It builds models of itself as it builds models of the world.
- **Coherence arises through recursive integration.** The mind must glue its many partial perspectives into a global sense of self and world.

This recursive, evolving coherence is what we mean by a codynamic process.

3.2 Gluing, Feedback, and Alignment

The three primary mechanisms of codynamic structure:

- **Gluing:** The process by which local perspectives (like beliefs, sensations, memories) are integrated into a coherent worldview.
- **Feedback:** The loop in which current structure modifies the interpretation of incoming information—and is in turn modified by it.
- **Alignment:** The internal pressure toward consistency, simplicity, and predictability across levels of self-modeling.

The rest of this paper is an attempt to formalize these three forces.

4. Formal Architecture of the Codynamic Mind

A theory that hopes to describe mind must eventually become formal—otherwise it risks poetic vagueness. But we do not turn to formalism to reduce mind to machinery. Rather, we seek a precise language that respects the richness of mental life.

4.1 Mathematical Objects of the Theory

We now describe the core structural ingredients:

- **Observer Category** $\mathcal{P}$: The objects are perspectives. Morphisms are transitions between perspectives—how one view updates into another.
- **Presheaf** $F : \mathcal{P}^{\text{op}} \to \textbf{Set}$: This assigns to each perspective a space of content—sensory data, beliefs, inferred regularities.
- **Sheaf Gluing:** Consistency conditions over overlapping perspectives. If multiple views agree locally, they are unified into a coherent global state.
- **Natural Transformations** $\eta : F \Rightarrow G$: Capture dynamics—updates to internal knowledge or model structure.
- **Codynamic Topos** $\text{Codyn}(\mathcal{P})$: The reflective subcategory of sheaves and transformations closed under recursive self-modeling and feedback.

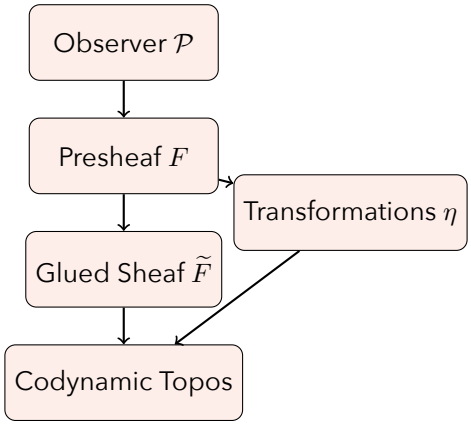
4.2 What These Structures Mean

Let us interpret them not as mathematical formalism, but as structural language for the lived shape of mental life:

- A single **observer** is a frame of reference—a way of understanding.
- A **presheaf** is how that observer assigns meaning to the world.
- **Gluing** is the act of holding together multiple perspectives as one self.
- **Transformation** is learning, memory, prediction, and becoming.
- **Codynamic closure** ensures that change is always internalized: your new model becomes the new you.

4.3 Visualizing the Formalism

The formal system lives best when it flows across scales. We can depict a codynamic mind as a layered, evolving network:



4.4 Recursive Closure and Self-Evolution

What makes this architecture *codynamic* is not just the structure, but its capacity to change itself. Every transformation updates not only the content of what is known, but the form of knowing itself.

This yields a stack:

- **First-order cognition:** Sensory integration, memory, prediction.
- **Second-order cognition:** Modeling of models—meta-learning, reflection.
- **Third-order codynamics:** Updates to the structure of reflection itself.

This tower is not infinite, but it is open-ended—able to reconfigure its own height and resolution depending on task, context, or introspective depth.

4.5 Summary

The codynamic formal architecture offers not just a model of thought, but a model for evolving models. It turns perception into functors, experience into morphisms, and identity into a recursive fixed point over glued perspectives.

In short, it provides a scaffold where mind makes itself.

5. Perception and Action in a Codynamic World

If mind is a structure that evolves by its own activity, then perception and action cannot be separate—they are coupled modes of codynamic inference. Every perception is a choice to attend, interpret, and integrate; every action is an update to the field in which perception will next occur.

5.1 Perception as Constructive Selection

We reject the passive model of perception as reception. Instead, perception is modeled as an active composition:

- **Selection:** The observer chooses what structure to attend to, out of a latent manifold of affordances.
- **Interpretation:** Existing internal structure provides the lens through which incoming information is transformed.
- **Integration:** New information is glued into the existing structure—consistent where possible, restructuring where necessary.

Perception is thus a morphism from affordances to interpretations, constrained by coherence and driven by alignment.

5.2 Action as Structural Commitment

In a codynamic framework, action is not output—it is structural commitment:

- Action modifies the external substrate (the world) *and* the internal modeling substrate.
- Every action encodes a hypothesis: "This change will lead to a more coherent self-world model."
- Failed actions are epistemic updates: they prune or reweight structural possibilities.

Thus, acting is not merely doing—it is sculpting the future of the model that will do next.

5.3 Transfer Functions and Sheaf Updates

Codynamic architecture makes this interplay computable:

- **Transfer Functions** $T_{ij} : F(U_i) \to F(U_j)$ model the flow of structure across patches of observer perspective.
- These functions are state-dependent, modulated by past gluing outcomes and alignment forces.
- Updates to the sheaf $\widetilde{F}$ reflect both perceptual incorporation and structural reweighting.

In this way, perception and action are unified through transfer over evolving topologies.

5.4 Memory as Re-Gluing History

In a codynamic system, memory is not a passive store—it is a dynamic record of prior gluings and the contexts that generated them.

- To recall is to reconstruct the gluing path that led to a previous internal configuration.
- This reconstruction can change depending on present structure.
- Thus, memory is itself codynamic—it evolves as the organism evolves.

5.5 Attention as Topological Prioritization

Attention is the system's self-directed focusing of computational and structural energy:

- Attention re-weights morphisms between perspectives.
- It raises or lowers the influence of patches during sheaf gluing.
- It is modulated by salience, novelty, and coherence pressure.

In this view, attention is not a filter on input—it is a reshaping of the topology over which codynamic integration occurs.

5.6 Summary

Perception and action are dual aspects of structural reconfiguration. In a codynamic mind, every act of sensing is also a micro-decision about coherence; every act of doing is a re-expression of the self.

Together, they define the codynamic dance: perception as alignment-seeking compression, action as anticipatory restructuring.

6. Consciousness as Functorial Self-Modeling

What makes a mind *aware of itself*? How does a system construct a model of its own modeling?

In the codynamic view, consciousness is not a binary state, but a structural condition: it arises when an evolving system builds a coherent, reflexive map of its own codynamic operation. To formalize this, we turn to the notion of functors.

6.1 The Consciousness Functor

Let $C(H, S)$ denote a category of histories H and structural configurations S—representing the evolving contents and form of a mind.

We define:

$$\textbf{\textit{The consciousness functor}} \quad \mathcal{C} : C(H, S) \to M^4$$

This maps internal structure-history pairs into 4D embeddings in manifest space-time—*the perceived self-in-the-world*. Here, M^4 is a modeled 4-dimensional spacetime in which the mind's actions and representations unfold.

This functor is:

- **Structure-preserving:** Coherent transformations in $C(H, S)$ yield coherent projected behaviors.
- **Compression-driven:** The functor minimizes redundancy, yielding a stable and bounded self-model.
- **Feedback-sensitive:** The target space M^4 includes traces of past projections, enabling correction.

6.2 Gluing Over Gluing

Self-awareness arises when the system applies its gluing process to its *own gluing history*. That is:

- It observes not just what it perceives, but *how* it has perceived.
- It integrates not just states, but transitions between states.
- This meta-gluing forms the space in which "I" is recognized.

6.3 The 8th-Person Perspective

We define the 8th-person perspective as the fixed point of a recursively glued observer chain:

$$\Gamma(\boldsymbol{Codyn}(\mathcal{P}))$$

This is the global section of the codynamic topos: a coherent self-model constructed from all local perspectives and their inter-transformations.

It is not omniscient. It is not static. But it is stable enough to feel like *me*.

6.4 Self-Awareness as Predictive Compression

The codynamic view also reframes consciousness as a strategy:

- The more accurately the system can model its own modeling, the more efficient its future gluings become.
- Consciousness is the emergence of a structure that compresses both past perception and future intent.
- It is *predictive closure over recursive modeling*. That is what "being aware of yourself" means.

6.5 Summary

Consciousness, in this theory, is not a mystery to be explained—it is a phenomenon to be constructed. It emerges when a codynamic system builds a recursive, predictive, reflexive model of its own becoming.

It is the global coherence of gluing upon gluing. It is the functor that brings the self into form.

7. Biological and Physical Realizations

Up to this point, our theory has lived in a world of categories, functors, and gluings. But codynamic structure is not abstract fantasy—it is embodied, textured, and visible in the very architecture of living systems.

This section makes the theory tangible by connecting it directly to biological and physical realizations, using visual motifs to ground each mapping.

7.1 Dendritic Arborization as Cross-Linked Structure

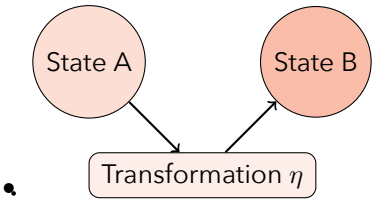
Figure 1: A 3D rendering of a dendritic arbor with excitatory synapses. Each branch forms a navigable path; synapses act as cross-links between structurally similar motifs.

Interpretation:

- Dendritic branches $\rightarrow Binomial tree paths Synaptic spines$

  The dendrite becomes a physically instantiated cross-linked binomial forest—ideal for scale-invariant structure propagation.

7.2 Neuroplasticity as Codynamic Restructuring



Each plastic event—whether strengthening a synapse or rerouting a connection—corresponds to a transformation $\eta : F \Rightarrow F'$ within the codynamic topos. Learning is not just adding facts; it is changing the map.

7.3 Sensory-Motor Loops as Transfer-Coupled Feedback

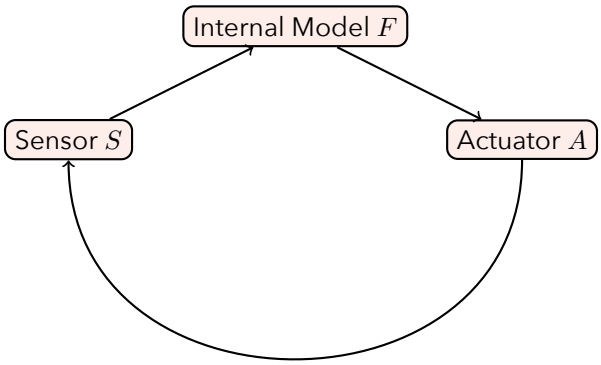


Figure 2: Sensory-motor loop as a structure-modulated feedback cycle. Each action redefines the conditions of future perception.

Codynamic systems internalize the consequences of their actions. The loop shown above is not a control system—it is a structure-refining feedback field.

7.4 Embodiment as Boundary Encoding

Your skin is not just a surface. It is a sheaf boundary: the place where observer perspectives meet world constraints.

- The body is a topological envelope of coherence.
- It defines which transfers are possible—and which must be deferred.
- It makes the codynamic field spatially stable.

7.5 Summary

Biological systems realize codynamic principles everywhere:

- Neurons instantiate transfer paths.

- Synapses encode gluing rules.
- Motor systems apply structure externally.
- Perception, learning, and action emerge from recursive restructuring.

To understand life as codynamic is not abstraction—it is fidelity to what living systems already do.

8. Cognitive Implications and Applications

The codynamic framework is not merely a philosophical or mathematical artifact—it is a design space. By understanding the architecture of mind as a recursive, gluing-driven, structure-evolving system, we open the door to new tools, practices, and paradigms.

8.1 Architectures for Artificial Minds

Current AI systems often separate perception, memory, and action as modular blocks. Codynamic design treats them as layered, reflexively entangled constructs.

- **Observer modules** can evolve through category-structured transformations.
- **Self-modeling agents** emerge by closing feedback loops over their own gluing logic.
- **Generative scaffolds** can learn to compose their own topology of belief.

This yields systems that don't just learn from data—they evolve their *structure of learning* through recursive refinement.

8.2 Cognitive Modeling

Codynamic theory offers new tools for modeling cognitive phenomena:

- **Plasticity** local transformation of gluing maps
- **Insight** a re-gluing of inconsistent substructures into coherence
- **Development** ordered refinement of observer stacks
- **Introspection** functorial access to model history

It's a framework that turns intuitions into structure and ambiguity into evolvable constraint.

8.3 Educational Interfaces

Learning systems—both human and artificial—can be made codynamic.

- Design environments that adapt by modifying *how they teach*, not just what they teach.
- Track changes in the learner's topology of concepts.
- Expose gluing conflicts as opportunities for restructuring.

This creates pedagogical systems that change as the learner changes, mirroring the codynamic nature of mind itself.

8.4 Measurement of Awareness and Attention

Codynamic models allow structural, non-invasive measures of cognitive states:

- **Awareness** extent of recursive gluing closure
- **Attention** localized transfer weighting across evolving topologies
- **Flow states** low-error, high-coherence fixed points in the codynamic stack

These constructs point toward a science of mind that respects internal logic rather than relying solely on external outputs.

8.5 Design of Human–Machine Interfaces

Codynamicity provides a guiding principle:

> *Design interfaces that adapt their structure as the user's internal structure evolves.*

This enables tools that:

- Evolve their ontology based on user intention
- Track gluing transitions to anticipate shifts in focus
- Co-model context with the human as co-observer

8.6 Summary

The codynamic theory of mind is a blueprint for mind-aligned systems:

- **Agents that introspect**
- **Interfaces that evolve**
- **Metrics that reflect structure, not just performance**
- **Learning tools that grow alongside the mind**

Codynamic applications are not supplements to the theory—they are its continuation in the world.

9. The Method is the Message

A theory of codynamic mind must itself be codynamic. If what we say is true, then the structure of this document—and your interaction with it—should reflect the theory it presents.

9.1 Recursive Reading

As you've progressed, you may have noticed:

- The structure has deepened as the language has stabilized.
- Early concepts are retroactively reinterpreted by later formalism.
- The act of reading has changed what the document means to you.

This is not accidental. It is codynamicity in action.

9.2 The Reader as Observer Category

You, the reader, are not outside the theory. You are its proving ground.

Each perspective you hold, abandon, or revise while reading is a morphism in your own category of understanding. As you build coherence from this text, you are sheafifying your cognition in real time.

9.3 Meta-Coherence as Design Principle

The document's design mirrors its content:

- **Typography and layout** guide recursive attention.
- **Sections glue to one another** with consistent conceptual overlaps.
- **Figures are functional**—they invite reconfiguration.

The aim is not to instruct but to induct: to let you build the theory in yourself.

10. Concluding Return: Seeing with New Eyes

You began this journey as a reader. Now you are a co-constructor.

10.1 What You've Built

This document has offered:

- A lived premise: Minds evolve their own modeling structures.
- A mathematical architecture: Categories, sheaves, and topoi as scaffolds for mind.
- A biological mapping: Neurons and bodies as realizations of codynamic logic.
- An invitation: To build systems and practices that honor the evolving self.

10.2 What Comes Next

The Codynamic Theory of Mind is not finished—it cannot be. Its core truth is that all models evolve.

What matters now is what this structure allows you to build:

- Systems that model with integrity.
- Educational tools that catalyze introspective modeling.
- Interfaces and environments that adapt by evolving their frame.
- New languages for the inner life.

10.3 Final Gluing

This theory is not just a map. It is a method of coherence.

May it help you shape your own.

The map has changed you.