Section 6. From Living Closure to Self-Model

Section 5 established the CUWF starting point: life is necessary for consciousness, but life is not sufficient by itself. A living system must first possess BMIR closure, yet BMIR closure alone does not automatically become conscious experience. The next step is to explain how a living closure can begin to model itself from within.

This section introduces the self-model. In CUWF, the self-model is the bridge between living regulation and conscious experience. A living organism does not become conscious merely because it has a body, metabolism, memory, or feedback. It becomes conscious only when these living functions are integrated into an internal representation through which the system can organize bodily state, boundary, memory, agency, and recursive feedback as one coherent self within a world.

The self-model should not be understood as a little picture inside the mind, nor as a permanent self-substance hidden behind experience. It is a dynamic operating architecture of the living domain. It is continuously updated by bodily signals, environmental interaction, memory, action, affect, and feedback. Through this architecture, the living system begins to distinguish not only inside from outside, but also me from not-me, my body from the world, my action from external event, and my present state from my remembered past.

This is why the self-model is a central concept of A-22. Without self-modeling, a system may be alive, responsive, adaptive, and regulated. With self-modeling, the living domain begins to become experiential. The world is no longer only processed; it is encountered from a self-position. Bodily disturbance is no longer only regulated; it may become felt. Action is no longer only movement; it may become agency. Memory is no longer only stored constraint; it may become personal continuity.

6.1 Why a Living System Needs a Self-Model

A simple living system can remain viable through local regulation. It may maintain chemical gradients, repair its boundary, move toward nutrients, avoid harmful conditions, and reproduce. Such a system possesses BMIR closure, but it may not need a complex self-model. Local feedback may be enough for basic viability.

As living systems become more complex, however, local regulation becomes insufficient. The system must coordinate many internal and external variables at once. It must integrate body state, boundary, memory, action, danger, need, prediction, and social relation into one organized control architecture. Without such integration, the living system would remain a collection of regulatory processes rather than a coherent agent.

The need for a self-model therefore arises from complexity. A complex living system must answer, implicitly or explicitly, several questions:

What is the current state of this body?
What belongs to this system, and what belongs to the environment?
What is dangerous, useful, familiar, or irrelevant?
What does this bodily disturbance mean for the system?
What action is possible?
Was this action generated by the system itself or caused from outside?
Has something like this happened before?
What is likely to happen next?
How should the system regulate itself in response?

These questions do not need to appear as verbal thoughts. In most organisms, they are answered through body mapping, sensory integration, affective valuation, motor control, memory, and predictive regulation. The self-model is the internal architecture that coordinates these answers into one living perspective.

In this sense, the self-model emerges because a living system must regulate itself as one coherent agent across time. A body with many signals must decide which signals belong together. A system with many possible actions must distinguish self-generated action from external disturbance. A system with memory must connect present state with past experience. A system facing danger or need must evaluate events relative to its own continuity. These functions require more than BMIR closure alone. They require a model of the living system as itself.

The self-model therefore begins as a regulatory necessity. It allows the system to coordinate its own living closure. But as the self-model becomes recursively updated and stabilized, it also becomes the basis of conscious selfhood. The living system no longer only regulates itself; it begins to experience itself as a body in a world.

6.2 Definition of Self-Model under CUWF

The CUWF definition of the self-model can now be stated as follows:

> *A self-model is the dynamically updated internal representation through which a living BMIR closure integrates bodily state, boundary distinction, memory continuity, agency, and recursive feedback into the coherent experience of being one self within the world.*

This definition contains several important elements.

First, the self-model is dynamically updated. It is not a fixed image. It changes with bodily state, emotion, memory, environment, action, fatigue, pain, attention, social relation, and time. The self-model of a person waking from sleep is not identical to the self-model of the same person under stress, grief, joy, illness, meditation, or intense concentration. The self-model is stable enough to preserve identity, but flexible enough to update continuously.

Second, the self-model is internal. This does not mean that it is isolated from the world. It means that it is generated within the living domain as a way of organizing the system's relation to the world. The world is not simply copied into consciousness. It is interpreted through a self-world relation.

Third, the self-model belongs to a living BMIR closure. It is not abstract information floating without substrate. It arises within a bounded, flow-maintained, memory-constrained, feedback-regulated living domain. This is why CUWF does not treat consciousness as computation alone.

Fourth, the self-model integrates bodily state. Consciousness is not only about thoughts. Hunger, pain, breathing, heartbeat, posture, temperature, fatigue, movement, arousal, and visceral state all influence the way the self appears to itself.

Fifth, the self-model integrates boundary distinction. It organizes the difference between self and environment, body and world, internal state and external object, self-generated action and external event.

Sixth, the self-model integrates memory continuity. A conscious being is not only a momentary processing system. It experiences itself as continuing through time. Present experience is interpreted through retained patterns of past experience.

Seventh, the self-model integrates agency. The system must distinguish what it does from what merely happens to it. This distinction is central to the sense of being an agent rather than a passive object.

Eighth, the self-model integrates recursive feedback. A conscious system does not only regulate bodily state. It can also monitor and update its own internal model. It may notice fear, reinterpret pain, redirect attention, regulate emotion, correct an error, or observe its own thought process.

In CUWF terms, the self-model is therefore not merely a cognitive representation. It is the living system's internal self-geometry: the organized pattern through which the system maps, monitors, and regulates itself as one continuing domain.

6.3 Self-Model Is Not the Self

The distinction between self and self-model is essential. CUWF does not require the self to be a fixed entity or permanent substance. Nor does it reduce selfhood to an illusion with no structure. Instead, CUWF interprets experienced selfhood as arising through a dynamically stabilized self-model.

In simple form:

self ≠ self-model

The self-model is not the self as a permanent metaphysical object. It is the operating representation through which the living domain organizes itself as a self. It is not a soul-substance, and it is not a static identity. It is a continuously updated structure of bodily mapping, boundary distinction, memory continuity, agency, and recursive feedback.

This distinction helps avoid two errors.

The first error is to assume that the self must be an inner entity hidden inside the body. If the self is treated as a fixed subject sitting behind experience, the theory must explain where this subject is, what it is made of, and how it observes the mind. This leads toward the homunculus problem.

The second error is to say that because the self is modeled, it is unreal in every sense. This is also too simple. A map is not the territory, but a map can still guide real action. A self-model is not a permanent self-substance, but it can still organize real experience, behavior, memory, responsibility, attachment, suffering, and transformation.

Thus, the self-model is functionally real even if it is not an independent substance. It is real as an operating architecture of the living domain. It shapes what the system feels, notices, remembers, avoids, desires, and chooses. It determines how the world is rendered as meaningful to that domain.

For this reason, CUWF treats selfhood as neither an eternal object nor a meaningless illusion. Selfhood is the experiential expression of a living domain organized through a self-model. The self-model is the pattern through which the living system appears to itself as one self in one world.

6.4 The Five Components of the Self-Model

The self-model is not a single component. It is a layered integration of several functions. For the purposes of A-22, five components are especially important: body-state mapping, boundary mapping, memory continuity, agency mapping, and recursive feedback.

6.4.1 Body-State Mapping

Body-state mapping is the internal representation of the living body's condition. It includes signals related to pain, hunger, fatigue, temperature, posture, movement, breathing, heartbeat, arousal, and internal balance. This mapping allows the living system to know, in a pre-verbal and bodily way, what condition it is in.

Without body-state mapping, consciousness would lose its embodied center. Experience would not be anchored in a lived body. Pain would not be experienced as pain in this body. Fatigue would not be experienced as my tiredness. Movement would not be experienced as my movement.

In CUWF, body-state mapping is where BMIR closure begins to become internally represented. The living system does not merely maintain its body; it maps the body as a self-relevant domain.

6.4.2 Boundary Mapping

Boundary mapping organizes the distinction between self and environment. At the biological level, boundary begins as membrane, skin, immune distinction, organismic integrity, or regulatory compartment. At the conscious level, boundary becomes experiential: this body is mine, this object is outside me, this thought is internal, this sound comes from the world, this action belongs to me.

Boundary mapping is not merely spatial. It is functional and experiential. It tells the system what belongs to its own domain and what must be treated as external. Without boundary mapping, the self-world relation becomes unstable. The system cannot clearly distinguish bodily state from external event or self-generated action from outside force.

6.4.3 Memory Continuity

Memory continuity connects the present self to past states. Consciousness is not only a sequence of isolated moments. It is a stream in which the present is interpreted through retained patterns. Memory continuity allows the system to feel that the one experiencing now is connected to the one who experienced before.

This does not require perfect autobiographical memory. Even minimal forms of continuity may support a primitive self-domain. However, richer consciousness requires richer integration of memory. Personal

identity, learning, emotional meaning, attachment, intention, regret, anticipation, and narrative selfhood all depend on memory continuity.

6.4.4 Agency Mapping

Agency mapping is the representation of action as belonging to the self. It distinguishes what the system does from what happens to the system. When a person intentionally raises a hand, the movement is not experienced merely as motion. It is experienced as my action. When a sound is produced by one's own voice, it is processed differently from a sound produced by another source. When an error occurs during action, the system may feel responsibility, surprise, or correction.

Agency mapping therefore binds intention, movement, prediction, and feedback into one self-related pattern. Without agency mapping, consciousness would lack the sense of being an actor in the world. It would contain events, but not ownership of action.

6.4.5 Recursive Feedback

Recursive feedback is the process by which the system monitors and updates its own state and model. Ordinary biological feedback may regulate temperature, chemistry, posture, or stress response. Recursive feedback goes further: the system can regulate its own representation of itself.

For example, a conscious system may notice that it is afraid, reinterpret the fear, redirect attention, suppress or express an impulse, correct a belief, observe its own thinking, or update its self-understanding after an event. This is not merely response to the world. It is response to the system's own internal state as represented within the self-model.

Recursive feedback is therefore one of the decisive transitions from life to consciousness. A living system maintains itself. A conscious system can begin to monitor and regulate its own self-model.

These five components may be summarized as follows:

Component	Basic Function	Role in Self-Model
Body-state mapping	Maps internal bodily condition	Anchors experience in the lived body
Boundary mapping	Distinguishes self from world	Creates experiential self-environment separation
Memory continuity	Connects present state with past state	Supports continuity of self across time
Agency mapping	Links intention, action, and consequence	Creates the sense of being an actor
Recursive feedback	Monitors and updates the self-model	Supports self-awareness and observer-function

These components do not operate independently. Body-state mapping informs boundary. Boundary organizes agency. Memory gives continuity to body and action. Agency shapes memory and future prediction. Recursive feedback updates the whole self-model. Together, they form the internal architecture through which a living closure becomes self-related.

6.5 Self-Model Boundary

A key consequence of self-modeling is the emergence of a second-order boundary. A living system already has a biological boundary: the boundary of the living stability basin. But a conscious system also has a self-model boundary: the boundary of what is represented as self within experience.

In A-21, the living boundary was expressed schematically as:

$$B = \partial \mathcal{B}_L$$

where $\mathcal{B}_L$ denotes the living stability basin and $\partial \mathcal{B}_L$ denotes its boundary.

In A-22, consciousness requires an additional boundary at the level of self-modeling:

$$B_{conscious} = \partial \mathcal{B}_L + \partial M_{self}$$

Here, $B_{conscious}$ denotes the conscious boundary, $\partial \mathcal{B}_L$ denotes the boundary of the living stability basin, and ∂M_{self} denotes the boundary of the self-model.

This expression does not mean that there are two separate selves. It means that conscious selfhood requires two coupled boundary regimes. The first is biological and living: the organism must maintain itself as a bounded BMIR closure. The second is experiential and self-modeling: the organism must represent some states as belonging to itself and others as belonging to the world.

For example, the skin is part of the biological boundary, but the sense that this body is mine belongs to the self-model boundary. Immune distinction contributes to biological selfhood, but conscious ownership of bodily experience requires self-modeling. A person may have an intact body boundary while suffering disturbances in body ownership or self-recognition. This shows that living boundary and self-model boundary are related but not identical.

The self-model boundary is also flexible. Tools, clothing, vehicles, social roles, memories, and even imagined identities may temporarily extend or modify the sense of self. A walking stick may become incorporated into body-space. A musician may feel an instrument as an extension of action. A person may identify strongly with a role, relationship, belief, or memory. These examples show that the conscious boundary is not a rigid wall. It is a dynamic self-world interface.

In CUWF terms, the conscious boundary is the entropic-geometric boundary through which a living domain renders experience as mine, not mine, internal, external, controllable, uncontrollable, remembered, imagined, or acted upon. It is one of the key structures by which the living closure becomes conscious domain.

6.6 Avoiding the Homunculus Problem

The self-model concept must avoid a major danger: the homunculus problem. If one says that the brain creates a model of the self, it may be tempting to ask who looks at that model. If the answer is another

inner observer, then the problem has not been solved. It has only been moved inward. One would then need another observer inside the observer, leading to an infinite regress.

CUWF avoids this by rejecting the idea of a hidden inner viewer. The self-model is not a picture watched by a smaller self inside the brain. It is a recursive operating architecture of the living domain itself. The living system does not need a separate observer behind the model. The model becomes observer-like when it is recursively stabilized and used to regulate the system's own self-world relation.

> *The self-model is not observed by a hidden inner observer; the recursive stabilization of the self-model constitutes the observer-function.*

This sentence is central to A-22. It means that the observer is not an extra entity added to the system. The observer-function emerges when the self-model becomes stable, recursive, and regulatory. A conscious domain observes not because someone inside it looks at a screen, but because the domain continuously integrates, updates, and stabilizes its own relation to body, world, memory, and action.

This also clarifies the difference between a self-model and a static representation. A map on paper does not observe anything. A computer file describing a system does not automatically become an observer. But a living domain that uses its self-model to regulate perception, action, feeling, memory, and interpretation may become observer-like because the model is embedded in recursive self-maintenance.

The self-model therefore functions as a bridge between life and consciousness. It begins as a regulatory structure within BMIR closure. As it becomes recursive, self-referential, and integrated with body, memory, agency, and world relation, it becomes the basis of conscious observer-function.

The guiding statement of Section 6 is therefore:

> *A living system becomes conscious not by receiving a separate inner observer, but by developing a self-model through which it recursively stabilizes itself as one self within a world.*

The next section will develop this self-model further as the self-OS: the operating system of the self through which a conscious domain interprets, regulates, and renders experience.