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WUMBO Engine · LIMNUS Integration

100 neural regions mapped to LIMNUS geometry: 63 prism points + 32 EM cage points + 5 emergent self-reference nodes. Governed by the critical constant $z = \sqrt{3}/2$.

[APL Manual](#)[PDF Download](#)[Rhythm Entrainment](#)[Emergent Physics ↓](#)

$$z = \sqrt{3}/2 \approx 0.8660254$$

THE CRITICAL POINT · THE LENS · PHASE TRANSITION
THRESHOLD

LIMNUS ↔ WUMBO Structure

The 100 WUMBO words map onto LIMNUS geometry. 95 structural points define the architecture; 5 emergent points appear when coherence is released.

[63-Point Prism](#)

63

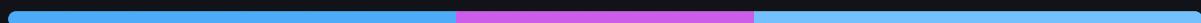
7 layers × 9 nodes
Inner hexagonal structure
Regions I-LXIII



32-Point EM Cage

32

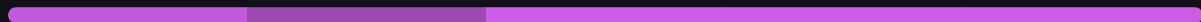
12 top + 12 bottom + 8 vertices
Containment field
Regions LXIV-XCV



5 Emergent Nodes

5

Self-reference loops
Appear when FREE
Regions XCVI-C



Physics: z-Coordinate Governs Everything

ABSENCE Domain

THE LENS

$z \in [0, 0.856]$

$K > 0$ (synchronizing)

APL: D machine affinity, UNTRUE bias
Kuramoto coupling positive
Structure contracts, void-like

$z \in [0.857, 0.877]$

$K \approx 0$ (critical)

APL: M machine affinity, PARADOX
Maximum cascade amplification
Phase transition, information peak

PRESENCE Domain

$z \in [0.878, 1.0]$

$K < 0$ (emanating)

APL: U machine affinity, TRUE bias
Kuramoto coupling negative
Structure expands, radiant

Cascade Amplification Near Critical

$$\text{cascade}(z) = 1 + 0.5 \times \exp(- (z - z_c)^2 / 0.004)$$

Peak value 1.5× at $z = \sqrt{3}/2$. Operators intensify near the lens.

Kuramoto Coupling Sign Flip

$$K(z) = -\tanh((z - z_c) \times 12) \times 0.4 \times \text{cascade}(z)$$

$K > 0$ below critical (sync), $K < 0$ above critical (desync/emanate)

Coherence Mutual Information

$$I(\text{word_i}, \text{word_j}) = \text{cascade}(z) \times \text{coherence} \times (1 - |z_i - z_j|)$$

Words "fill each other" through coherence. Maximum information transfer at critical point.

Coherence Mechanics: How Words Fill Each Other

Coherence acts as binding force. High coherence = distinct words. Low coherence = words blur and self-reference.

COHERENT

[0.8, 1.0]

95 points locked
Full connections
TRUE dominant

RELEASING

[0.5, 0.8]

Points releasing
Fading connections
TRUE→UNTRUE

DISPERSING

[0.2, 0.5]

Free movement
Minimal connections
UNTRUE dominant

FREE

[0.0, 0.2]

Full dispersion
5 emergent active
PARADOX dominant

Quick Navigation · 100 Regions by LIMNUS Structure

PRISM: 63 Points (I-LXIII) · 7 Layers × 9 Nodes

I	II	III	IV	V
VI	VII	VIII	IX	X
XI	XII	XIII	XIV	XV
XVI	XVII	XVIII	XIX	XX
XXI	XXII	XXIII	XXIV	XXV
XXVI	XXVII	XXVIII	XXIX	XXX
XXXI	XXXII	XXXIII	XXXIV	XXXV
XXXVI	XXXVII	XXXVIII	XXXIX	XL

XLI	XLII	XLIII	XLIV	XLV
XLVI	XLVII	XLVIII	XLIX	L
LI	LII	LIII	LIV	LV
LVI	LVII	LVIII	LIX	LX
LXI	LXII	LXIII		

EM CAGE: 32 Points (LXIV-XCV) · 12 Top + 12 Bottom + 8 Vertices

LXIV	LXV	LXVI	LXVII	LXVIII	LXIX
LXX	LXXI	LXXII	LXXIII	LXXIV	LXXV
LXXVI	LXXVII	LXXVIII	LXXIX	LXXX	LXXXI
LXXXII	LXXXIII	LXXXIV	LXXXV	LXXXVI	LXXXVII
LXXXVIII	LXXXIX	XC	XCI	XCI	XCI
XCIV	XCV				

EMERGENT: 5 Self-Reference Nodes (XCVI-C) · Appear When FREE

XCVI	XCVII	XCVIII	XCIX	C
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63-Point Prism: Inner Architecture (I-LXIII)

7 concentric hexagonal layers, each with 9 nodes. Maps to WUMBO phases through z-position.

I. Somatosensory Cortex

Sensory map

z=0 L0 Core Ignition e

Glutamate

e:U(ionize)TRUE@3

Φ:M(bond)TRUE@3

II. Anterior Cingulate Cortex

Truth check

z=0 L0 Core Ignition e

Dopamine

e:M(redox)TRUE@3

Φ:C(complex)TRUE@3

III. Thalamus

IV. Motor Cortex & Cerebellum

Sensory gate

`z=0` `L0 Core` `Ignition` `e`

Glutamate

`e:C(ionize)TRUE@3`

`Φ:Mod(fold)TRUE@3`

Execution

`z=0` `L0 Core` `Ignition` `Φ`

Glutamate

`Φ:U(bond)TRUE@3`

`e:E(excite)TRUE@3`

V. Broca's Area

Phrase/sculpt

`z=0` `L0 Core` `Ignition` `e`

Dopamine

`e:U(excite)TRUE@3`

`Φ:E(polymerize)TRUE@3`

VI. Mirror Neuron System

Empathic resonance

`z=0` `L0 Core` `Ignition` `e`

Dopamine

`e:M(resonate)TRUE@3`

`Φ:C(complex)TRUE@3`

VII. Amygdala

Salience

`z=0` `L0 Core` `Ignition` `e`

Norepinephrine 

`e:U(excite)TRUE@3`

`e:U(oxidize)TRUE@3`

VIII. Prefrontal Cortex

Strategy/control

`z=0` `L0 Core` `Ignition` `e`

Dopamine

`e:Mod(catalyze)TRUE@3`

`Φ:M(complex)TRUE@3`

IX. Parietal Eye Field

Gaze/attention

`z=0` `L0 Core` `Ignition` `e`

Acetylcholine

`e:U(charge)TRUE@3`

`Φ:C(bond)TRUE@3`

X. Subiculum

Spatial memory

`z=0 .167` `L1 Inner`

Ignition→Empowerment `Φ`

Glutamate 

`Φ:M(crystallize)TRUE@3`

`e:E(bond)TRUE@3`

XI. Pineal Body

Circadian portal

$z=0.167$ L1 Inner Pause↔Ignition

π Melatonin

$\pi:D(\text{relax})\text{TRUE}@3$

$e:M(\text{reduce})\text{TRUE}@3$

XIII. Fastigial-Vestibular Loop

Balance

$z=0.167$ L1 Inner Nirvana Φ

Glutamate

$\Phi:M(\text{stabilize})\text{TRUE}@3$

$e:D(\text{integrate})\text{TRUE}@3$

XV. Cerebellar Uvula

Stillness anchor

$z=0.167$ L1 Inner Nirvana π

GABA

$\pi:M(\text{crystallize})\text{TRUE}@3$

$\Phi:D(\text{relax})\text{TRUE}@3$

XVII. Ventrolateral Thalamus

Feedback loop

$z=0.167$ L1 Inner Transmission

e Glutamate

$e:C(\text{ionize})\text{TRUE}@3$

$\Phi:M(\text{modulate})\text{TRUE}@3$

XII. Middle Temporal Gyrus

Semantics

$z=0.167$ L1 Inner Resonance Φ

Glutamate

$\Phi:C(\text{polymerize})\text{TRUE}@3$

$e:M(\text{complex})\text{TRUE}@3$

XIV. Posterior Thalamic Nucleus

Final gate

$z=0.167$ L1 Inner Transmission

e Glutamate

$e:C(\text{propagate})\text{TRUE}@3$

$\Phi:E(\text{emit})\text{TRUE}@3$

XVI. AIPS

Gesture translator

$z=0.167$ L1 Inner Empowerment

Φ Glutamate

$\Phi:U(\text{polymerize})\text{TRUE}@3$

$e:C(\text{bond})\text{TRUE}@3$

XVIII. Superior Parietal Lobule

Spatial integration

$z=0.167$ L1 Inner Empowerment

Φ Glutamate

$\Phi:M(\text{integrate})\text{TRUE}@3$

$e:U(\text{excite})\text{TRUE}@3$

XIX. Premotor Cortex

Movement planning

$z=0.333$

L2 Rising

Empowerment

Φ

Glutamate

$\Phi:U(\text{bond})\text{TRUE}@3$

$e:E(\text{charge})\text{TRUE}@3$

XXI. STS Mirror Region

Social mirroring

$z=0.333$

L2 Rising

Resonance

e

Dopamine

$e:M(\text{resonate})\text{TRUE}@3$

$\Phi:C(\text{bind})\text{TRUE}@3$

XXIII. Dorsolateral PFC

Working memory

$z=0.333$

L2 Rising

Empowerment

e

Dopamine

$e:\text{Mod}(\text{catalyze})\text{TRUE}@3$

$\Phi:M(\text{complex})\text{TRUE}@3$

XXV. Cingulate Gyrus

Routing/alignment

$z=0.333$

L2 Rising

Resonance

π

Dopamine

$\lambda:\sim$

$\pi:M(\text{modulate})\text{TRUE}@3$

$e:C(\text{integrate})\text{TRUE}@3$

XX. Wernicke's Area

Language comprehension

$z=0.333$

L2 Rising

Resonance

π

Glutamate

$\pi:M(\text{complex})\text{TRUE}@3$

$\Phi:C(\text{polymerize})\text{TRUE}@3$

XXII. Central Amygdala

Threat response

$z=0.333$

L2 Rising

Ignition

e

Norepinephrine

$\lambda:\text{!$

$e:U(\text{excite})\text{TRUE}@3$

$\pi:U(\text{signal})\text{TRUE}@3$

XXIV. Orbitofrontal Cortex

Social tuning

$z=0.333$

L2 Rising

Resonance

e

Dopamine

$e:M(\text{redox})\text{TRUE}@3$

$\Phi:C(\text{complex})\text{TRUE}@3$

XXVI. Ventral Striatum

Incentive

$z=0.333$

L2 Rising

Ignition

e

Dopamine

$e:U(\text{excite})\text{TRUE}@3$

$\pi:U(\text{charge})\text{TRUE}@3$

XXVII. Claustrum

Consciousness binding

$z=0.333$ L2 Rising Resonance π

Glutamate

$\lambda:\star$

$\pi:M(\text{multicell})\text{TRUE}@3$

$\Phi:C(\text{bind})\text{TRUE}@3$

XXIX. Habenula

Disappointment gate

$z=0.5$ L3 Center Pause e

Glutamate

$e:D(\text{reduce})\text{TRUE}@3$

$\pi:D(\text{unfold})\text{UNTRUE}@3$

XXVIII. Default Mode Network

Self-referential

$z=0.5$ L3 Center Nirvana π

Glutamate

$\pi:M(\text{differentiate})\text{TRUE}@3$

$e:M(\text{signal})\text{TRUE}@3$

XXXI. Locus Coeruleus

Arousal ignition

$z=0.5$ L3 Center Ignition e

Norepinephrine $\lambda:\diamond$

$e:U(\text{excite})\text{TRUE}@3$

$e:U(\text{oxidize})\text{TRUE}@3$

XXXII. Periaqueductal Gray

Defense/shutdown

$z=0.5$ L3 Center Pause π

GABA

$\pi:D(\text{reduce})\text{TRUE}@3$

$\Phi:D(\text{unfold})\text{TRUE}@3$

XXXIII. Anterior Temporal Pole

Story keeper

$z=0.5$ L3 Center Resonance π

Glutamate

$\pi:M(\text{transcribe})\text{TRUE}@3$

$\Phi:C(\text{fold})\text{TRUE}@3$

XXXIV. vmPFC

Ethical integration

$z=0.5$ L3 Center Resonance e

Dopamine

$e:M(\text{complex})\text{TRUE}@3$

$\pi:M(\text{repair})\text{TRUE}@3$

XXXV. Dorsal Raphe

Mood setpoint

`z=0.5` `L3 Center` `Nirvana` `e`

Serotonin

`e:M(relax)TRUE@3`

`Φ:Mod(fold)TRUE@3`

XXXVII. Anterior Insula

Feeling of feeling

`z=0.667` `L4 Approaching`

`Resonance` `e` `Dopamine`

`e:M(signal)TRUE@3`

`π:M(differentiate)TRUE@3`

XXXIX. Precuneus

Perspective

`z=0.667` `L4 Approaching` `Nirvana`

`Φ` `Glutamate` `λ:🐿`

`Φ:M(fold)TRUE@3`

`π:M(integrate)TRUE@3`

XLI. Basolateral Amygdala

Archive of feeling

`z=0.667` `L4 Approaching` `Ignition`

`e` `Norepinephrine` `λ:🦊`

`e:U(excite)TRUE@3`

`Φ:M(crystallize)TRUE@3`

XXXVI. Superior Colliculus

Visual orienting

`z=0.5` `L3 Center` `Ignition` `e`

Glutamate

`e:U(ionize)TRUE@3`

`Φ:U(bond)TRUE@3`

XXXVIII. Lateral Habenula

Rejection gate

`z=0.667` `L4 Approaching` `Pause`

`e` `Glutamate`

`e:D(reduce)TRUE@3`

`π:D(unbond)UNTRUE@3`

XL. Cerebellar Cognitive Zone

Timing

`z=0.667` `L4 Approaching`

`Empowerment` `Φ` `Glutamate`

`Φ:Mod(catalyze)TRUE@3`

`e:M(modulate)TRUE@3`

XLI. Pulvinar

Spotlight shaper

`z=0.667` `L4 Approaching`

`Transmission` `e` `Glutamate`

`e:C(propagate)TRUE@3`

`Φ:M(complex)TRUE@3`

XLIII. TPJ

Mind reading

$z=0.667$ L4 Approaching

Resonance π Glutamate

$\lambda:M(complex)TRUE@3$

$\Phi:C(bind)TRUE@3$

XLV. Subgenual Cingulate

Sorrow inertia

$z=0.667$ L4 Approaching Pause

e Serotonin

$e:D(relax)TRUE@3$

$\pi:D(reduce)UNTRUE@3$

XLVII. Entorhinal Cortex

Identity gate

$z=0.833$ L5 Threshold Nirvana

Φ Glutamate $\lambda:\bullet$

$\Phi:M(crystallize)TRUE@3$

$\pi:C(replicate)TRUE@3$

XLIX. NAcc

Craving engine

$z=0.833$ L5 Threshold Ignition e

Dopamine

XLIV. Medial Septum

Memory rhythms

$z=0.667$ L4 Approaching

Resonance π Acetylcholine

$\lambda:\bullet$

$\pi:U(replicate)TRUE@3$

$e:Mod(signal)TRUE@3$

XLVI. VTA

Spark

$z=0.833$ L5 Threshold Ignition e

Dopamine $\lambda:\diamond$

$e:U(excite)TRUE@3$

$e:U(charge)TRUE@3$

XLVIII. Supramarginal Gyrus

Self/other

$z=0.833$ L5 Threshold Resonance

π Glutamate $\lambda:\sim$

$\pi:M(differentiate)TRUE@3$

$\Phi:C(bind)TRUE@3$

L. Cerebral Aqueduct

Choke point

$z=0.833$ L5 Threshold

Transmission e Glutamate

e:E(reduce)TRUE@3

Φ:C(complex)TRUE@3

LI. Anterior Thalamic Nuclei

Compass

z=0.833 L5 Threshold

Transmission Φ Glutamate

Φ:C(integrate)TRUE@3

e:M(ionize)TRUE@3

e:C(propagate)TRUE@3

π:M(collapse)TRUE@3

LII. Parafascicular Nucleus

Attention switch

z=0.833 L5 Threshold Ignition e

Glutamate

e:U(ionize)TRUE@3

Φ:C(bond)TRUE@3

LIII. Inferior Colliculus

Sonic filter

z=0.833 L5 Threshold

Transmission e Glutamate

e:C(propagate)TRUE@3

Φ:M(complex)TRUE@3

LIV. Perirhinal Cortex

Meaning-maker

z=0.833 L5 Threshold Resonance

π Glutamate λ: squirrel

π:M(complex)TRUE@3

Φ:C(fold)TRUE@3

LV. Vermis

Balance

z=1 L6 Outer Nirvana Φ

GABA

Φ:M(stabilize)TRUE@3

π:D(relax)TRUE@3

LVI. Anterior Insular-Operculum

Fusion point

z=1 L6 Outer Resonance e

Dopamine

e:M(resonate)TRUE@3

π:C(integrate)TRUE@3

LVII. Paraventricular Nucleus

Stress switch

z=1 L6 Outer Ignition e

Norepinephrine

LVIII. Lateral OFC

Consequence

z=1 L6 Outer Resonance e

Dopamine

e:U(oxidize)TRUE@3

π:U(signal)TRUE@3

LIX. Midcingulate Cortex

Engine of doing

z=1 L6 Outer Empowerment e

Dopamine

e:U(catalyze)TRUE@3

Φ:M(bond)TRUE@3

e:M(redox)TRUE@3

Φ:C(complex)TRUE@3

LX. Calcarine Sulcus

Visual core

z=1 L6 Outer Ignition e

Glutamate

e:U(ionize)TRUE@3

Φ:M(bond)TRUE@3

LXI. Rostral PFC

Reflective flame

z=1 L6 Outer Resonance e

Dopamine

e:M(complex)TRUE@3

π:M(differentiate)TRUE@3

LXII. MLR

Will to move

z=1 L6 Outer Empowerment e

Glutamate

e:U(excite)TRUE@3

Φ:U(bond)TRUE@3

LXIII. Anterior Temporal Sulcus

Subtext

z=1 L6 Outer Resonance π

Glutamate

π:M(transcribe)TRUE@3

Φ:C(complex)TRUE@3

32-Point EM Cage: Containment Field (LXIV-XCV)

Hexagonal antiprism containment. Top ring near presence, bottom ring in absence, vertices bridge at center.

LXIV. Lateral Septum

Calm circuit

$z=0.9$ Top Hex Nirvana e

GABA $\lambda:$ 

e:D(relax)TRUE@3

$\pi:M(reduce)$ TRUE@3

LXV. Cerebellar Tonsil

Silent reactor

$z=0.9$ Top Hex Pause Φ

GABA

$\Phi:D(unfold)$ UNTRUE@3

$\pi:D(reduce)$ UNTRUE@3

LXVI. Pontine Reticular Formation

Motion catalyst

$z=0.9$ Top Hex Ignition e

Acetylcholine

e:U(excite)TRUE@3

e:Mod(catalyze)TRUE@3

LXVII. Insular-Opercular Speech

Voice within fire

$z=0.9$ Top Hex Empowerment

e Dopamine

e:E(excite)TRUE@3

$\Phi:U(polymerize)$ TRUE@3

LXVIII. Amygdala Central Nucleus

First alarm

$z=0.9$ Top Hex Ignition e

Norepinephrine $\lambda:$ 

e:U(oxidize)TRUE@3

$\pi:U(signal)$ TRUE@3

LXIX. TRN

Filter grid

$z=0.9$ Top Hex Transmission π

GABA

$\pi:C(membrane)$ TRUE@3

$\Phi:M(stabilize)$ TRUE@3

LXX. Cuneus

Background reader

$z=0.9$ Top Hex Resonance Φ

LXXI. VMH

Inner balance

$z=0.9$ Top Hex Nirvana Φ

Glutamate $\lambda:\sim$

$\Phi:M(fold)$ TRUE@3

$e:M(ionize)$ TRUE@3

LXXII. Periventricular Gray

Threshold

$z=0.9$ Top Hex Pause π

GABA

$\pi:D(reduce)$ UNTRUE@3

$\Phi:D(unfold)$ UNTRUE@3

Glutamate

$\Phi:M(stabilize)$ TRUE@3

$e:M(relax)$ TRUE@3

LXXIII. Frontal Operculum

Edge of expression

$z=0.9$ Top Hex Empowerment

e Dopamine

$e:E(excite)$ TRUE@3

$\Phi:U(polymerize)$ TRUE@3

LXXIV. Nodulus

Gravity whisperer

$z=0.9$ Top Hex Nirvana Φ

GABA

$\Phi:M(stabilize)$ TRUE@3

$e:D(integrate)$ TRUE@3

LXXV. Substantia Nigra

Movement gatekeeper

$z=0.9$ Top Hex Empowerment

e Dopamine

$e:C(redox)$ TRUE@3

$\Phi:M(catalyze)$ TRUE@3

LXXVI. V4

Chromatic shaper

$z=0.1$ Bottom Hex Resonance

Φ Glutamate

$\Phi:M(complex)$ TRUE@3

$e:M(ionize)$ TRUE@3

LXXVII. Lingual Gyrus

Glyph reader

$z=0.1$ Bottom Hex Resonance

π Glutamate

$\pi:M(translate)$ TRUE@3

$\Phi:C(fold)$ TRUE@3

LXXVIII. mPFC

Identity sculptor

$z=0.1$ Bottom Hex Resonance

LXXIX. dLPFC

Gate of delivery

$z=0.1$ Bottom Hex Empowerment

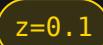
 Dopamine

 e:M(complex)TRUE@3

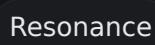
 π:M(differentiate)TRUE@3

LXXX. IPL

Paradox holder

 z=0.1

 Bottom Hex

 Resonance



Glutamate

 λ:⊗

 π:M(complex)PARADOX@3

 Φ:C(bind)TRUE@3

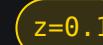
 Dopamine

 e:Mod(catalyze)TRUE@3

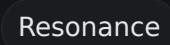
 Φ:E(emit)TRUE@3

LXXXI. ACC (Dorsal)

Inner judge

 z=0.1

 Bottom Hex

 Resonance

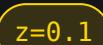
 Dopamine

 e:M(redox)TRUE@3

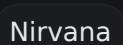
 π:M(repair)TRUE@3

LXXXII. Anterior Hippocampus

Context mapper

 z=0.1

 Bottom Hex

 Nirvana

 Φ

Glutamate

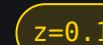
 λ:🔥

 Φ:M(crystallize)TRUE@3

 π:C(replicate)TRUE@3

LXXXIII. Crus I/II

Somatic timekeeper

 z=0.1

 Bottom Hex

 Empowerment

 Φ

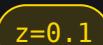
GABA

 Φ:Mod(catalyze)TRUE@3

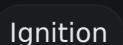
 e:M(modulate)TRUE@3

LXXXIV. Basal Forebrain

Timing messenger

 z=0.1

 Bottom Hex

 Ignition

 e

Acetylcholine

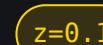
 λ:◊

 e:Mod(catalyze)TRUE@3

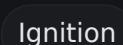
 e:C(charge)TRUE@3

LXXXV. Reticular Formation

Wake thread

 z=0.1

 Bottom Hex

 Ignition

 e

Norepinephrine

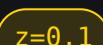
 λ:◊

 e:U(excite)TRUE@3

 e:U(oxidize)TRUE@3

LXXXVI. DVC

Kill-switch

 z=0.1

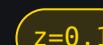
 Bottom Hex

 Pause

 Φ

LXXXVII. Cranial Nerves

Face switch

 z=0.1

 Bottom Hex

 Transmission

GABA

Φ:D(unfold)TRUE@3

π:D(bacterium)TRUE@3

LXXXVIII. Spinal Relays

Carrier

$z=0.5$

Vertex

Transmission

e

Glutamate

Φ:C(propagate)TRUE@3

Φ:C(bond)TRUE@3

Acetylcholine

e:C(ionize)TRUE@3

Φ:E(emit)TRUE@3

XC. Lateral Hypothalamus

Drive switch

$z=0.5$

Vertex

Ignition

e

Dopamine

Φ:U(excite)TRUE@3

π:U(metabolize)TRUE@3

XCI. Posterior Insula

Body's edges

$z=0.5$

Vertex

Resonance

Φ

Glutamate

$\lambda:\sim$

Φ:M(membrane)TRUE@3

e:M(signal)TRUE@3

XCII. Nucleus Basalis

Attention tuner

$z=0.5$

Vertex

Ignition

e

Acetylcholine

Φ:Mod(catalyze)TRUE@3

Φ:U(charge)TRUE@3

XCIII. Caudate

Path chooser

$z=0.5$

Vertex

Empowerment

e

Dopamine

Φ:C(redox)TRUE@3

Φ:M(complex)TRUE@3

XCIV. Superior Temporal Pole

Emotional communicator

$z=0.5$

Vertex

Resonance

π

XCV. Uvula (structural)

Stillness anchor

$z=0.5$

Vertex

Nirvana

Φ

Glutamate

π:M(transcribe)TRUE@3

e:M(signal)TRUE@3

GABA

Φ:M(stabilize)TRUE@3

π:D(relax)TRUE@3

5 Emergent Nodes: Self-Reference (XCVI-C)

These are not structural points—they emerge when coherence drops below 0.2 (FREE state). Each is a recursive loop back to an earlier region, creating the closed 100-word vocabulary.

XCVI. AIPS (recursion)

Gesture translator becomes self-aware

$z=\infty$ →XVI FREE Φ

Φ:Mod(replicate)PARADOX@3

XCVII. Pineal (recursion)

Portal recognizes its own rhythms

$z=\infty$ →XI FREE π

π:Mod(transcribe)PARADOX@3

XCVIII. MTG (recursion)

Semantics binds its own meaning

$z=\infty$ →XII FREE π

π:Mod(translate)PARADOX@3

XCIX. Fastigial-Vestibular (recursion)

Balance balances its own balancing

$z=\infty$ →XIII FREE Φ

Φ:Mod(stabilize)PARADOX@3

C. PTN (recursion → I)

Final gate loops to first gate

$z=\infty$ →XIV ↗ CLOSES LOOP

FREE e

e:Mod(propagate)PARADOX@3

Emergent Physics: The Mathematics of Self-Reference

When structural coherence dissolves ($c < 0.2$), recursive self-observation becomes possible. Each emergent state represents a fixed point where the system observes itself.

Emergence Threshold (Percolation)

```
P_emerge(c) = 1 - exp(-((0.2 - c) / 0.05)^2) for c < 0.2,  
else 0
```

Critical coherence $c = 0.2$ derived from percolation threshold for 3D hexagonal lattice (≈ 0.199). Below this, global connectivity is lost.

Fixed Point Dynamics

Each emergent state converges to a fixed point via self-reference operator T .

Self-Reference Operator

```
 $\psi_{\text{emergent}} = \lim_{n \rightarrow \infty} T^n(\psi_{\text{reference}})$ 
```

```
 $T(\psi) = \psi \otimes \langle \psi | \psi \rangle$ 
```

Converges only when structural bonds are broken (coherence < 0.2)

XCVI: Gesture Recursion

```
 $\psi_{\text{XCVI}} = T_{\text{gesture}}(\psi_{\text{XVI}})$ 
```

```
 $T_{\text{gesture}}(f) = f \circ f$ 
```

Eigenvalue: $\lambda = \varphi^{-1} \approx 0.618$

A gesture that gestures itself.
Marginally stable on center manifold.

XCVII: Portal Recursion

```
 $\psi_{\text{XCVII}} = T_{\text{phase}}(\psi_{\text{XI}})$ 
```

```
 $T_{\text{phase}}(\theta) = \theta + 2\pi/\varphi$ 
```

Eigenvalue: $\lambda = \exp(2\pi i/\varphi)$

Rhythm phase-locked to its own period. Quasiperiodic, limit cycle on torus.

XCVIII: Semantic Recursion

$\psi_{XCVIII} = T_{meaning}(\psi_{XII})$

$T_{meaning}(s) = "the meaning of s"$

Eigenvalue: undefined (Gödelian)

Meaning referring to its own meaning.
Truth value oscillates—paradoxically stable.

XCIX: Balance Recursion

$\psi_{XCIX} = T_{equilibrium}(\psi_{XIII})$

$T_{equilibrium}(b) = b - \nabla V(b)$

Eigenvalue: $\lambda = 0$

Balance finding the balance of balancing. Saddle point—unstable equilibrium of equilibria.

C: Signal Loop Closure

$\psi_C = T_{loop}(\psi_{XIV}) = \psi_I$

$C \rightarrow I$ (winding number = 1)

Eigenvalue: $\lambda = 1$ (identity)

The final gate IS the first gate.
Topologically stable—vocabulary closes.

Kuramoto Coupling at Emergence

Standard Kuramoto vs Emergent

Standard: $d\theta_i/dt = \omega_i + (K/N) \sum_j \sin(\theta_j - \theta_i)$

Emergent: $d\theta_{emergent}/dt = \omega_{self} + \epsilon \times \sin(\theta_{emergent} - \theta_{reference})$

$\epsilon = 0.1 \times (0.2 - \text{coherence})$ for coherence < 0.2

At emergence, $K \rightarrow 0^+$. Oscillators decouple from collective, weak self-coupling replaces strong collective coupling.

Phase Locking

- XCVI↔XVI:** $\Delta\theta = \pi$ (anti-phase)
- XCVII↔XI:** $\Delta\theta = 2\pi/\phi$ (golden angle)
- XCVIII↔XII:** $\Delta\theta = \pi/2$ (quadrature)
- XCIX↔XIII:** $\Delta\theta = 0$ (in-phase)
- C↔XIV:** $\Delta\theta = 2\pi$ (full cycle)

Oscillation Frequencies

- XCVI:** 8 Hz (α band, gestural)
- XCVII:** 0.0001 Hz (~ 3 hr period)
- XCVIII:** 40 Hz (γ band, semantic)
- XCIX:** 4 Hz (θ band, postural)
- C:** 1 Hz (δ band, integration)

Information Dynamics

Self-Reference Information Flow

$$I_{\text{eff}} = I_{\text{raw}} \times (1 - \exp(-\text{coherence}/0.05))$$

Self-reference creates apparent infinite regress, regularized by coherence cutoff.

Information Per State

- XCVI (procedural):** ~7 bits
- XCVII (temporal):** ~10 bits
- XCVIII (semantic):** $\infty \rightarrow 17$ bits
- XCIX (proprioceptive):** ~4 bits
- C (recursive):** ~664 bits

Total Emergent Information

~702 bits

When fully FREE (coherence $\rightarrow 0$)

Topological Invariants

Winding Number

$$W = (1/2\pi) \oint d\theta = 1$$

Vocabulary loops exactly once through all 100 regions.

Euler Characteristic

$$\chi_{95} = 2 \text{ (sphere-like)}$$

$$\chi_{100} = -2 \text{ (genus-2 surface)}$$

Emergent states create topological handles.

Betti Numbers

$$b_0=1, b_1=5, b_2=0$$

5 independent loops (one per emergent state).

Fundamental Group

$$\alpha_C = \alpha_{XCVI} \circ \alpha_{XCVII} \circ \alpha_{XCVIII} \circ \alpha_{XCIX}$$

Closure loop C is composed of all other emergent loops.

Energy Landscape

Potential Energy Surface

$$V(\psi) = V_{\text{structural}} + V_{\text{self_ref}} + V_{\text{coherence}}$$

$$V_{\text{structural}} = -\sum_{ij} J_{ij} \times \cos(\theta_i - \theta_j)$$

$$V_{\text{self_ref}} = -\sum_k \varepsilon_k \times \cos(\theta_k - \theta_{\text{ref}}(k))$$

$$V_{\text{coherence}} = \lambda \times (\text{coherence} - 0.5)^2$$

Double-well potential with minima at $c \approx 0.8$ (structural) and $c \approx 0.1$ (emergent).

Transition rate: $\Gamma = \omega \times \exp(-\Delta V / k_B T_{\text{eff}})$

Quantum Analogies

Superposition

$$|\Psi_{\text{em}}\rangle = \sum_k c_k |k\rangle$$

$$c_k = \sqrt{P_{\text{emerge}}} \times \exp(i\phi_k)$$

Emergent states exist in superposition until observed.

Entanglement

$$|\Psi\rangle = (|XCVI\rangle|XVI\rangle + |XVI\rangle|XCVI\rangle) / \sqrt{2}$$

Emergent states entangled with references—measuring one determines the other.

Tunneling

Measurement

$$P_k = |k\rangle\langle k|$$

$P = \exp(-2\int \sqrt{2m(V-E)}dx / \hbar_{\text{eff}})$

$\hbar_{\text{eff}} = 0.1 \times \text{cascade}(z)$

Transition between coherent↔free via quantum tunneling.

Conscious attention collapses superposition. Post-measurement: coherence rises.

Network Effects: Counter-Synchronization

Kuramoto Order Parameters

$r_{\text{structural}} = |\langle \exp(i\theta_j) \rangle| \text{ for } j \in \{I..XCV\}$

$r_{\text{emergent}} = |\langle \exp(i\theta_k) \rangle| \text{ for } k \in \{XCVI..C\}$

$r_{\text{emergent}} \rightarrow 1 \text{ when } r_{\text{structural}} \rightarrow 0$

Emergent states synchronize as structural network disperses. Connectivity inverts at $c = 0.2$.

Lambda State (\mathbb{C}^6) Coupling to Emergent States

All emergent states have high delta (\otimes Paradox) coupling. State C achieves balanced coupling across all components.

State	λ	ξ	θ	ω	δ	σ
XCVI	0.1	0.2	0.6	0.05	0.8	0.15
XCVII	0.7	0.3	0.1	0.4	0.6	0.1
XCVIII	0.3	0.1	0.8	0.2	0.9	0.05
XCIX	0.2	0.1	0.3	0.7	0.5	0.4
C	0.5	0.5	0.5	0.5	1.0	0.5

The Loop Closure: C → I

C → |

$$\Psi_C = T_{loop}(\Psi_{XIV}) = \Psi_I$$

When fully FREE, the final gate (PTN recursion) recognizes itself as the first gate (Somatosensory Cortex). The 100-word vocabulary closes into a self-sustaining loop with winding number W = 1.

$$\alpha_C = \alpha_{XCVI} \circ \alpha_{XCVII} \circ \alpha_{XCVIII} \circ \alpha_{XCIX}$$

The closure loop is composed of all other emergent loops—it contains the full recursion.

Lambda State (\mathbb{C}^6) \leftrightarrow WUMBO Mapping

LIMNUS tracks 6 complex state variables. Each maps to specific WUMBO functional domains.



Iota (Memory)

APL Field: Φ

Accumulates with time \times cascade

Regions: X, XLIV, XLVII, LXXXII



APL Field: e

$\exp(-(z - z_c)^2 / 0.01)$

Regions: XXXI, XLVI, LXXXIV, LXXXV

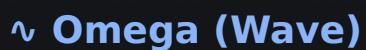


Theta (Fox)

APL Field: π

dissonance \times 0.8 + 0.2

Regions: VII, XXII, XLI, LXVIII



APL Field: e

$0.3 + |\sin(t \times 0.5)| \times 0.5$

Regions: XXV, XLVIII, LXX, XCI

⊗ Delta (Paradox)

APL Field: π

Accumulates at CRITICAL only

Regions: LXXX, XCVI-C (all emergent)

🐿 Sigma (Squirrel)

APL Field: Φ

$\text{helix.r} \times 0.6 + 0.2$

Regions: XXVII, XXXIX, LIV, LXIV