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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 |
|------|-------|--------|------|---|

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 λ:♂

e:U:A:BI0:T:α1

Φ:M:B:GE0:T:α1

II. Anterior Cingulate Cortex

Truth check

z=0 L0 Core Ignition e

Dopamine λ:~

e:M:G:CHEM:T:α2

Φ:C:B:BI0:T:α2

III. Thalamus

IV. Motor Cortex & Cerebellum

Sensory gate

$z=0$ L0 Core Ignition e

Glutamate $\lambda:\sim$

$e:C:G:BIO:T:\alpha 1$

$\Phi:M:F:GEO:T:\alpha 1$

Execution

$z=0$ L0 Core Ignition Φ

Glutamate $\lambda:\text{fox}$

$\Phi:U:B:BIO:T:\alpha 2$

$e:U:A:CHEM:T:\alpha 2$

V. Broca's Area

Phrase/sculpt

$z=0$ L0 Core Ignition e

Dopamine $\lambda:\diamond$

$e:U:A:BIO:T:\alpha 3$

$\Phi:M:B:CHEM:T:\alpha 3$

VI. Mirror Neuron System

Empathic resonance

$z=0$ L0 Core Ignition e

Dopamine $\lambda:\sim$

$e:M:G:BIO:T:\alpha 2$

$\Phi:C:B:CHEM:T:\alpha 2$

VII. Amygdala

Salience

$z=0$ L0 Core Ignition e

Norepinephrine $\lambda:\text{fox}$

$e:U:A:CHEM:T:\alpha 4$

$e:U:B:BIO:T:\alpha 4$

VIII. Prefrontal Cortex

Strategy/control

$z=0$ L0 Core Ignition e

Dopamine $\lambda:\sim$

$e:M:G:BIO:T:\alpha 3$

$\Phi:M:F:CHEM:T:\alpha 3$

IX. Parietal Eye Field

Gaze/attention

$z=0$ L0 Core Ignition e

Acetylcholine $\lambda:\diamond$

$e:U:A:BIO:T:\alpha 2$

$\Phi:C:B:GEO:T:\alpha 2$

X. Subiculum

Spatial memory

$z=0.167$ L1 Inner

Ignition→Empowerment Φ

Glutamate $\lambda:\text{apple}$

$\Phi:M:F:BIO:T:\alpha 3$

$e:U:B:GEO:T:\alpha 3$

XI. Pineal Body

Circadian portal

$z=0.167$ L1 Inner Pause↔Ignition

π Melatonin $\lambda:\otimes$

$\pi:M:D:CHEM:T:\alpha 5$

$e:M:G:BI0:T:\alpha 5$

XIII. Fastigial-Vestibular Loop

Balance

$z=0.167$ L1 Inner Nirvana Φ

Glutamate $\lambda:\text{🎃}$

$\Phi:M:F:GE0:T:\alpha 4$

$e:C:G:BI0:T:\alpha 4$

XII. Middle Temporal Gyrus

Semantics

$z=0.167$ L1 Inner Resonance Φ

Glutamate $\lambda:\text{🦊}$

$\Phi:C:B:BI0:T:\alpha 4$

$e:M:F:GE0:T:\alpha 4$

XV. Cerebellar Uvula

Stillness anchor

$z=0.167$ L1 Inner Nirvana π

GABA $\lambda:\text{🎃}$

$\pi:M:F:BI0:T:\alpha 3$

$\Phi:M:D:CHEM:T:\alpha 3$

XVI. AIPS

Gesture translator

$z=0.167$ L1 Inner Empowerment

Φ Glutamate $\lambda:\text{🦊}$

$\Phi:U:B:BI0:T:\alpha 4$

$e:C:A:GE0:T:\alpha 4$

XVII. Ventrolateral Thalamus

Feedback loop

$z=0.167$ L1 Inner Transmission

e Glutamate $\lambda:\text{🐿️}$

$e:C:S:BI0:T:\alpha 3$

$\Phi:M:G:GE0:T:\alpha 3$

XVIII. Superior Parietal Lobule

Spatial integration

$z=0.167$ L1 Inner Empowerment

Φ Glutamate $\lambda:\text{🎃}$

$\Phi:M:F:GE0:T:\alpha 4$

$e:U:A:BI0:T:\alpha 4$

XIX. Premotor Cortex

Movement planning

$z=0.333$ L2 Rising Empowerment

Φ Glutamate $\lambda:$ 

$\Phi:U:B:BI0:T:\alpha5$

$e:U:A:GE0:T:\alpha5$

XXI. STS Mirror Region

Social mirroring

$z=0.333$ L2 Rising Resonance e

Dopamine $\lambda: \sim$

$e:M:G:BI0:T:\alpha5$

$\Phi:C:B:CHEM:T:\alpha5$

XXIII. Dorsolateral PFC

Working memory

$z=0.333$ L2 Rising Empowerment

e Dopamine $\lambda: \sim$

$e:M:G:BI0:T:\alpha6$

$\Phi:M:F:CHEM:T:\alpha6$

XXV. Cingulate Gyrus

Routing/alignment

$z=0.333$ L2 Rising Resonance π

Dopamine $\lambda: \sim$

$\pi:M:G:BI0:T:\alpha6$

$e:C:F:CHEM:T:\alpha6$

XX. Wernicke's Area

Language comprehension

$z=0.333$ L2 Rising Resonance π

Glutamate $\lambda:$ 

$\pi:M:F:BI0:T:\alpha6$

$\Phi:C:B:GE0:T:\alpha6$

XXII. Central Amygdala

Threat response

$z=0.333$ L2 Rising Ignition e

Norepinephrine $\lambda:$ 

$e:U:A:CHEM:T:\alpha6$

$\pi:U:S:BI0:T:\alpha6$

XXIV. Orbitofrontal Cortex

Social tuning

$z=0.333$ L2 Rising Resonance e

Dopamine $\lambda: \sim$

$e:M:G:CHEM:T:\alpha5$

$\Phi:C:B:BI0:T:\alpha5$

XXVI. Ventral Striatum

Incentive

$z=0.333$ L2 Rising Ignition e

Dopamine $\lambda: \diamond$

$e:U:A:CHEM:T:\alpha5$

$\pi:U:A:BI0:T:\alpha5$

XXVII. Claustrum

Consciousness binding

$z=0.333$ L2 Rising Resonance π

Glutamate $\lambda:\text{🔥}$

$\pi:M:S:BIO:T:\alpha 7$

$\Phi:C:B:GEO:T:\alpha 7$

XXIX. Habenula

Disappointment gate

$z=0.5$ L3 Center Pause e

Glutamate $\lambda:\otimes$

$e:C:D:CHEM:U:\alpha 8$

$\pi:M:D:BIO:U:\alpha 8$

XXVIII. Default Mode Network

Self-referential

$z=0.5$ L3 Center Nirvana π

Glutamate $\lambda:\text{🔥}$

$\pi:M:S:BIO:T:\alpha 7$

$e:M:S:GEO:T:\alpha 7$

XXXI. Locus Coeruleus

Arousal ignition

$z=0.5$ L3 Center Ignition e

Norepinephrine $\lambda:\diamond$

$e:U:A:CHEM:T:\alpha 8$

$e:U:A:BIO:T:\alpha 8$

XXXII. Periaqueductal Gray

Defense/shutdown

$z=0.5$ L3 Center Pause π

GABA $\lambda:\otimes$

$\pi:M:D:BIO:T:\alpha 7$

$\Phi:M:D:CHEM:T:\alpha 7$

XXXIII. Anterior Temporal Pole

Story keeper

$z=0.5$ L3 Center Resonance π

Glutamate $\lambda:\text{🔥}$

$\pi:M:S:BIO:T:\alpha 8$

$\Phi:C:F:GEO:T:\alpha 8$

XXXIV. vmPFC

Ethical integration

$z=0.5$ L3 Center Resonance e

Dopamine $\lambda:\text{🎃}$

$e:M:F:BIO:T:\alpha 8$

$\pi:M:G:CHEM:T:\alpha 8$

XXXV. Dorsal Raphe

Mood setpoint

$z=0.5$ L3 Center Nirvana e

Serotonin $\lambda:\otimes$

e:M:D:CHEM:T: α 7

Φ :M:F:BIO:T: α 7

XXXVII. Anterior Insula

Feeling of feeling

$z=0.667$ L4 Approaching

Resonance e Dopamine $\lambda:\otimes$

e:M:S:BIO:T: α 9

π :M:S:CHEM:T: α 9

XXXIX. Precuneus

Perspective

$z=0.667$ L4 Approaching Nirvana

Φ Glutamate $\lambda:\otimes$

Φ :M:F:GE0:T: α 9

π :M:F:BIO:T: α 9

XXXVI. Superior Colliculus

Visual orienting

$z=0.5$ L3 Center Ignition e

Glutamate $\lambda:\diamond$

e:U:A:BIO:T: α 7

Φ :U:B:GEO:T: α 7

XLI. Basolateral Amygdala

Archive of feeling

$z=0.667$ L4 Approaching Ignition

e Norepinephrine $\lambda:\otimes$

XLII. Pulvinar

Spotlight shaper

$z=0.667$ L4 Approaching

Transmission e Glutamate $\lambda:\otimes$

e:U:A:CHEM:T: α 9

Φ :M:F:BIO:T: α 9

XLIII. TPJ

Mind reading

$z=0.667$ L4 Approaching

Resonance π Glutamate $\lambda:\sim$

π :M:G:BIO:T: α 9

Φ :C:B:GEO:T: α 9

e:C:S:BIO:T: α 8

Φ :M:G:GEO:T: α 8

XLIV. Medial Septum

Memory rhythms

$z=0.667$ L4 Approaching

Resonance π Acetylcholine

$\lambda:$ 

π :U:F:CHEM:T: α 8

e:M:S:BIO:T: α 8

XLV. Subgenual Cingulate

Sorrow inertia

$z=0.667$ L4 Approaching Pause

e Serotonin $\lambda:\otimes$

e:M:D:CHEM:U: α 9

π :M:D:BIO:U: α 9

XLVI. VTA

Spark

$z=0.833$ L5 Threshold Ignition e

Dopamine $\lambda:\diamond$

e:U:A:CHEM:T: α 10

e:U:A:BIO:T: α 10

XLVII. Entorhinal Cortex

Identity gate

$z=0.833$ L5 Threshold Nirvana

Φ Glutamate $\lambda:$ 

Φ :M:F:BIO:T: α 10

π :C:F:GEO:T: α 10

XLVIII. Supramarginal Gyrus

Self/other

$z=0.833$ L5 Threshold Resonance

π Glutamate $\lambda:\sim$

π :M:G:BIO:T: α 10

Φ :C:B:GEO:T: α 10

XLIX. NAcc

Craving engine

$z=0.833$ L5 Threshold Ignition e

L. Cerebral Aqueduct

Choke point

$z=0.833$ L5 Threshold

Dopamine $\lambda:\diamond$

$e:U:A:CHEM:T:\alpha 11$

$\Phi:C:B:BI0:T:\alpha 11$

Transmission e Glutamate $\lambda:$ 

$e:C:S:BI0:T:\alpha 10$

$\pi:M:D:GEO:T:\alpha 10$

LI. Anterior Thalamic Nuclei

Compass

$z=0.833$ L5 Threshold

Transmission Φ Glutamate

$\lambda:$ 

$\Phi:C:F:GEO:T:\alpha 10$

$e:M:A:BI0:T:\alpha 10$

LI. Parafascicular Nucleus

Attention switch

$z=0.833$ L5 Threshold Ignition e

Glutamate $\lambda:\diamond$

$e:U:A:BI0:T:\alpha 11$

$\Phi:C:B:GEO:T:\alpha 11$

LIII. Inferior Colliculus

Sonic filter

$z=0.833$ L5 Threshold

Transmission e Glutamate $\lambda:$ 

$e:C:S:BI0:T:\alpha 10$

$\Phi:M:G:GEO:T:\alpha 10$

LIV. Perirhinal Cortex

Meaning-maker

$z=0.833$ L5 Threshold Resonance

π Glutamate $\lambda:$ 

$\pi:M:S:BI0:T:\alpha 11$

$\Phi:C:F:GEO:T:\alpha 11$

LV. Vermis

Balance

$z=1$ L6 Outer Nirvana Φ

GABA $\lambda:$ 

$\Phi:M:F:GEO:T:\alpha 11$

$\pi:M:D:BI0:T:\alpha 11$

LVI. Anterior Insular-Operculum

Fusion point

$z=1$ L6 Outer Resonance e

Dopamine $\lambda:\sim$

$e:M:G:BI0:T:\alpha 12$

$\pi:C:F:CHEM:T:\alpha 12$

LVII. Paraventricular Nucleus

Stress switch

LVIII. Lateral OFC

Consequence

z=1 **L6 Outer** Ignition **e**

Norepinephrine $\lambda:\diamond$

e:U:A:CHEM:T: α 12

π :U:S:BI0:T: α 12

z=1 **L6 Outer** Resonance **e**

Dopamine $\lambda:\sim$

e:M:G:CHEM:T: α 11

Φ :C:B:BI0:T: α 11

LIX. Midcingulate Cortex

Engine of doing

z=1 **L6 Outer** Empowerment **e**

Dopamine $\lambda:\diamond$

e:U:A:BI0:T: α 12

Φ :M:B:GE0:T: α 12

LX. Calcarine Sulcus

Visual core

z=1 **L6 Outer** Ignition **e**

Glutamate $\lambda:\diamond$

e:U:A:BI0:T: α 11

Φ :M:B:GE0:T: α 11

LXI. Rostral PFC

Reflective flame

z=1 **L6 Outer** Resonance **e**

Dopamine $\lambda:$ 鼠

e:M:S:BI0:T: α 12

π :M:S:CHEM:T: α 12

LXII. MLR

Will to move

z=1 **L6 Outer** Empowerment **e**

Glutamate $\lambda:\diamond$

e:U:A:BI0:T: α 12

Φ :U:B:GE0:T: α 12

LXIII. Anterior Temporal Sulcus

Subtext

z=1 **L6 Outer** Resonance **π**

Glutamate $\lambda:$ 鼠

π :M:S:BI0:T: α 12

Φ :C:F:GE0:T: α 12

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 $\lambda:\text{ }$

e:M:D:CHEM:T: α 11
 π :M:D:BIO:T: α 11

LXVI. Pontine Reticular Formation

Motion catalyst

$z=0.9$ Top Hex Ignition e

Acetylcholine $\lambda:\diamond$

e:U:A:CHEM:T: α 11
e:M:G:BIO:T: α 11

LXVIII. Amygdala Central Nucleus

First alarm

$z=0.9$ Top Hex Ignition e

Norepinephrine $\lambda:\text{ }$

e:U:A:CHEM:T: α 12
 π :U:S:BIO:T: α 12

LXV. Cerebellar Tonsil

Silent reactor

$z=0.9$ Top Hex Pause Φ

GABA $\lambda:\otimes$

Φ :M:D:BIO:U: α 12
 π :M:D:CHEM:U: α 12

LXVII. Insular-Opercular Speech

Voice within fire

$z=0.9$ Top Hex Empowerment

e Dopamine $\lambda:\diamond$

e:U:A:BIO:T: α 12
 Φ :U:B:CHEM:T: α 12

LXIX. TRN

Filter grid

$z=0.9$ Top Hex Transmission π

GABA $\lambda:\sim$

π :C:G:BIO:T: α 11
 Φ :M:F:GEO:T: α 11

LXX. Cuneus

Background reader

$z=0.9$ Top Hex Resonance Φ

Glutamate $\lambda:\sim$

$\Phi:M:F:GEO:T:\alpha 11$

$e:M:A:BIO:T:\alpha 11$

LXXII. Periventricular Gray

Threshold

$z=0.9$ Top Hex Pause π

GABA $\lambda:\otimes$

$\pi:M:D:BIO:U:\alpha 11$

$\Phi:M:D:CHEM:U:\alpha 11$

LXXI. VMH

Inner balance

$z=0.9$ Top Hex Nirvana Φ

Glutamate $\lambda:\text{🎃}$

$\Phi:M:F:BIO:T:\alpha 12$

$e:M:D:CHEM:T:\alpha 12$

LXXIV. Nodulus

Gravity whisperer

$z=0.9$ Top Hex Nirvana Φ

GABA $\lambda:\text{🎃}$

$\Phi:M:F:GEO:T:\alpha 11$

$e:C:G:BIO:T:\alpha 11$

LXXV. Substantia Nigra

Movement gatekeeper

$z=0.9$ Top Hex Empowerment

e Dopamine $\lambda:\sim$

$e:C:G:CHEM:T:\alpha 12$

$\Phi:M:G:BIO:T:\alpha 12$

LXXVI. V4

Chromatic shaper

$z=0.1$ Bottom Hex Resonance

Φ Glutamate $\lambda:\text{🎃}$

$\Phi:M:F:GEO:T:\alpha 3$

$e:M:A:BIO:T:\alpha 3$

LXXVII. Lingual Gyrus

Glyph reader

$z=0.1$ Bottom Hex Resonance

π Glutamate $\lambda:\text{🐿️}$

$\pi:M:S:BIO:T:\alpha 3$

$\Phi:C:F:GEO:T:\alpha 3$

LXXVIII. mPFC

Identity sculptor

$z=0.1$ Bottom Hex Resonance

e Dopamine $\lambda:$ 🎨

ℳ e:M:F:BIO:T:α4

ℳ π:M:S:CHEM:T:α4

LXXX. IPL

Paradox holder

$z=0.1$ Bottom Hex Resonance

ℳ π Glutamate $\lambda:$ ⊗

ℳ π:M:G:BIO:P:α13

ℳ Φ:C:B:GEO:T:α13

LXXXII. Anterior Hippocampus

Context mapper

$z=0.1$ Bottom Hex Nirvana Φ

Glutamate $\lambda:$ 🎨

ℳ Φ:M:F:BIO:T:α3

ℳ π:C:F:GEO:T:α3

LXXXIV. Basal Forebrain

Timing messenger

$z=0.1$ Bottom Hex Ignition e

Acetylcholine $\lambda:$ ♦

ℳ e:M:G:CHEM:T:α3

ℳ e:C:A:BIO:T:α3

LXXIX. dLPFC

Gate of delivery

$z=0.1$ Bottom Hex Empowerment

e Dopamine $\lambda:$ ~

ℳ e:M:G:CHEM:T:α4

ℳ Φ:U:S:BIO:T:α4

LXXXI. ACC (Dorsal)

Inner judge

$z=0.1$ Bottom Hex Resonance

e Dopamine $\lambda:$ ~

ℳ e:M:G:CHEM:T:α4

ℳ π:M:F:BIO:T:α4

LXXXIII. Crus I/II

Somatic timekeeper

$z=0.1$ Bottom Hex Empowerment

ℳ Φ GABA $\lambda:$ ~

ℳ Φ:M:G:BIO:T:α4

ℳ e:M:G:GEO:T:α4

LXXXV. Reticular Formation

Wake thread

$z=0.1$ Bottom Hex Ignition e

Norepinephrine $\lambda:$ ♦

ℳ e:U:A:CHEM:T:α4

ℳ e:U:A:BIO:T:α4

LXXXVI. DVC

Kill-switch

$z=0.1$ Bottom Hex Pause Φ

GABA $\lambda:\otimes$

$\Phi:M:D:BI0:T:\alpha 3$

$\pi:M:D:CHEM:T:\alpha 3$

LXXXVIII. Spinal Relays

Carrier

$z=0.5$ Vertex Transmission e

Glutamate $\lambda:\star$

$e:C:S:BI0:T:\alpha 7$

$\Phi:C:B:GE0:T:\alpha 7$

XC. Lateral Hypothalamus

Drive switch

$z=0.5$ Vertex Ignition e

Dopamine $\lambda:\diamond$

$e:U:A:CHEM:T:\alpha 7$

$\pi:U:G:BI0:T:\alpha 7$

XCII. Nucleus Basalis

Attention tuner

$z=0.5$ Vertex Ignition e

Acetylcholine $\lambda:\diamond$

$e:M:G:CHEM:T:\alpha 7$

$e:U:A:BI0:T:\alpha 7$

LXXXVII. Cranial Nerves

Face switch

$z=0.1$ Bottom Hex Transmission

e Acetylcholine $\lambda:\star$

$e:C:S:BI0:T:\alpha 4$

$\Phi:U:S:GE0:T:\alpha 4$

LXXXIX. Globus Pallidus

Go/no-go

$z=0.5$ Vertex Empowerment π

GABA $\lambda:\otimes$

$\pi:M:D:BI0:T:\alpha 8$

$\Phi:M:D:GE0:T:\alpha 8$

XCI. Posterior Insula

Body's edges

$z=0.5$ Vertex Resonance Φ

Glutamate $\lambda:\sim$

$\Phi:M:G:BI0:T:\alpha 8$

$e:M:S:GE0:T:\alpha 8$

XCIII. Caudate

Path chooser

$z=0.5$ Vertex Empowerment e

Dopamine $\lambda:\sim$

$e:C:G:CHEM:T:\alpha 8$

$\Phi:M:F:BI0:T:\alpha 8$

XClV. Superior Temporal Pole

Emotional communicator

$z=0.5$ Vertex Resonance π

Glutamate $\lambda:$ 

$\pi:M:S:BIO:T:\alpha 7$

$e:M:S:CHEM:T:\alpha 7$

XCV. Uvula (structural)

Stillness anchor

$z=0.5$ Vertex Nirvana Φ

GABA $\lambda:$ 

$\Phi:M:F:GEO:T:\alpha 8$

$\pi:M:D:BIO:T:\alpha 8$

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

$z=\infty$ $\rightarrow XVI$ FREE Φ $\lambda:\otimes$

$\Phi:M:B:BIO:P:\alpha 13$

$\Phi:C:F:GEO:P:\alpha 13$

XCVII. Pineal (recursion)

Portal recognizes its own rhythms

$z=\infty$ $\rightarrow XI$ FREE π $\lambda:\otimes$

$\pi:M:G:CHEM:P:\alpha 14$

$\pi:C:S:BIO:P:\alpha 14$

XCVIII. MTG (recursion)

Semantics binds its own meaning

$z=\infty$ $\rightarrow XII$ FREE π $\lambda:\otimes$

$\pi:M:S:BIO:P:\alpha 14$

$\pi:C:B:GEO:P:\alpha 14$

XCIX. Fastigial-Vestibular (recursion)

Balance balances its own balancing

$z=\infty$ $\rightarrow XIII$ FREE Φ $\lambda:\otimes$

$\Phi:M:F:GEO:P:\alpha 14$

$\Phi:C:G:BIO:P:\alpha 14$

C. PTN (recursion → I)

Final gate loops to first gate

Z=∞ →XIV **♂ CLOSES LOOP**

FREE

→XIV

♂

CLOSES LOOP

λ:⊗

e:C:S:BI0:P:α15

e:M:A:GE0:P:α15

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

```
ψ_emergent = lim_{n→∞} T^n(ψ_reference)
```

```
T(ψ) = ψ ⊗ ⟨ψ|ψ⟩
```

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

XCVI: Gesture Recursion

XCVII: Portal Recursion

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

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

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

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

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

$$T_{phase}(\theta) = \theta + 2\pi/\phi$$

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

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

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

$$C \rightarrow I \text{ (winding number = 1)}$$

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

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

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)

XCIIX ↔ 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

Euler Characteristic

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

Vocabulary loops exactly once through all 100 regions.

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

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

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

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

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

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

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

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

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

Quantum Analogies

Superposition

$$|\psi_{em}\rangle = \sum_k c_k |k\rangle$$

$$c_k = \sqrt{P_{emerge}} \times$$

Entanglement

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

$\exp(i\phi_k)$

Emergent states exist in superposition until observed.

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

Tunneling

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

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

Transition between coherent↔free via quantum tunneling.

Measurement

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

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 | ι | 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 → I

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

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) ↔ WUMBO Mapping

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



Iota (Memory)

APL Field: Φ

Accumulates with time × cascade
Regions: X, XLIV, XLVII, LXXXII

Xi (Spark)

APL Field: e

$\exp(-(z - z_c)^2 / 0.01)$
Regions: XXXI, XLVI, LXXXIV, LXXXV



Theta (Fox)

~ Omega (Wave)

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