Coppalini Architecture / Language Mechanics 013

Formal Alphanumeric Closure

A typed registry for decimal, Greek, Roman-operator, and English written form

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An alphabet becomes formally usable when each admitted mark has a declared carrier, operation, reader, invariant, and receipt. The closure is finite at the registry layer and explicit about every further proof obligation.

Abstract

This paper defines an alphanumeric registry for Language Mechanics. The construction has four layers: decimal numerals for quantity and position; the 24 classical Greek letters for direct field offices; selected Roman symbols for formal operators; and the 26 English lowercase/uppercase pairs for a declared reader/action interface. It distinguishes the typed null $\varnothing = \mathsf{UNTYPEABLE}$ from the empty set and the zero digit, gives a six-place constructor for every glyph, and states a finite verification protocol. The Greek and decimal layers are closed registries in this edition. The English reader/action grid is an explicit interface declaration: each pairing is published with its proof burden rather than promoted as a theorem before its carrier, reader, invariant, receipt, and repeatable fit test have been supplied.

Why a character registry is needed

Every formal system writes through a finite visible alphabet. Yet the visible mark is only the beginning of its job. A symbol becomes usable when a reader can tell which mark it is, what role it has in the current expression, which operations are permitted, and how the result can be checked later.

The registry therefore treats a glyph as a compact interface packet:

$$\mathrm{CORDIS}(\ell[c]) = \big(\mathrm{Codomain}, \mathrm{Operation}, \mathrm{Receipt}, \mathrm{Domain}, \mathrm{Invariant}, \mathrm{Symmetry}\big). \tag{1}$$

The character ℓ carries a declared coordinate c. The six positions in (1) make it possible to ask the ordinary questions: What kind of output does this mark produce? What may it do? Where is its use recorded? What may it act on? What stays fixed? Which reversal, mirror, or partner relation has been declared?

The type boundary

Three frequently conflated marks have separate types in this architecture:

$$\begin{aligned} \varnothing &= \mathsf{UNTYPEABLE}, \\ \emptyset_{\mathrm{set}} &= \text{the set with no members}, \\ 0 &= \text{the decimal additive identity in its declared numerical domain.} \end{aligned} \tag{2}$$

They can appear near one another on a page. They do not perform the same work. The first is a typing boundary: no lawful operation has been admitted. The second is a set object. The third is a numeral used by a positional number system. The distinction prevents a missing type, a collection with no members, and a quantity at its additive identity from being silently merged.

Layer I: decimal numerals

The decimal digit set is

$$\mathbb{D}_{10} = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}. \tag{3}$$

For a finite sequence of digits, positional value is declared by

$$[d_k \dots d_1 d_0]_{10} = \sum_{j=0}^{k} d_j 10^j, \qquad d_j \in \mathbb{D}_{10}. \tag{4}$$

The decimal layer supplies counting and positional address. It is intentionally modest: a decimal string represents a number only inside the declared base-10 convention, and numerical operations remain typed by their relevant domain.

0	origin	**1**	unit	**2**	pair	**3**	triad	**4**	quarter
5	half-ten	**6**	sixfold	**7**	septad	**8**	octave	**9**	final digit

The verbal labels are reading aids, not replacements for arithmetic definitions. Equation (4) is the exact construction.

Layer II: Greek field registry

The Greek layer contains 24 canonical letters, each assigned one direct office in this edition. It is a finite registry, so its cardinality and uniqueness can be mechanically checked.

Greek field office		Greek field office	
α	Carriage	ν	Rhythm
β	Phase	ξ	Contrast
γ	Path	o	Occurrence (omicron)
δ	Change	π	Light
ϵ	Fit	ρ	Read
ζ	Memory	σ	State
η	Trust	τ	Time
θ	Survival	υ	Can
ι	Archive	ϕ	Drift
κ	Tuning	χ	Form
λ	Meaning	ψ	Mirror
μ	Measure	ω	Closure

The registry is direct: it gives a reader a stable vocabulary for the role being named. For example, ζ designates memory in the field register, while ρ designates the act or output of reading. The assignment does not replace the ordinary mathematical meanings of Greek letters in every discipline; its force is scoped to the declared Language Mechanics registry.

Seven-band observer order

The architecture also declares a seven-band order used to label a visible color carrier:

$$(\Psi, \Theta, \theta, \pi, \epsilon, \Phi, \Lambda) = (\text{Red}, \text{Orange}, \text{Yellow}, \text{Green}, \text{Blue}, \text{Indigo}, \text{Violet}). \tag{5}$$

This is a finite mnemonic and design coordinate. Color remains physically readable through an observer model, an illumination condition, a spectral relation, and a stated response function. Equation (5) does not identify a color swatch with a physical field equation.

Layer III: Roman operators

Roman notation supplies selected operators and constants that have established formal roles. The registry lists their local architecture role alongside their standard mathematical use.

Mark	Formal use	Declared architecture reading
$i = -\Omega$	a quarter-turn / complex structure on an oriented real plane	Gravity office: a bounded, regulated experiential relation; this reading requires the declared reader scope.
g	metric tensor or local bilinear comparison rule	metric field witness when supplied by a physical adapter.
H	Hamiltonian or other declared generator	a law of transport stated in its native domain.
$\sqrt{5}$	positive real square root of 5	a normalization appearing in the Fibonacci carrier family.

The equality $i = -\Omega$ is a conventional matrix identity when

$$\Omega = \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}, \qquad \Omega^2 = -I. \tag{6}$$

It acts inside the two-dimensional carrier. An embodied three-dimensional or spacetime occurrence requires a declared bridge: an inscription or interface carrier e, a transport relation L, and a reader ρ. The operator by itself does not exhaust that bridge.

Layer IV: English reader/action interface

The English alphabet is organized as a paired interface. Lowercase names the local reading coordinate; uppercase names the corresponding admitted action. The pairing is an involution schema:

$$C : \mathcal{L}_{26}^{-} \longleftrightarrow \mathcal{L}_{26}^{+}, \qquad C^2 = \mathrm{id}, \qquad \rho_a(T_A x) = \overline{T}_A(\rho_a(x)). \tag{7}$$

The final clause asks the action to have a declared reader-side consequence. It is the proof obligation for each pair, not a claim that every line below has already been independently established in every use context.

Read	**Local coordinate**	**Act**	**Admitted action**
a	Address	A	Arrive
b	Boundary	B	Bind
c	Contact	C	Couple
d	Difference	D	Decide
e	Evidence	E	Evaluate
f	Form	F	Fit
g	Gravity	G	Ground
h	Horizon	H	Hold
i	Interface	I	Integrate
j	Junction	J	Join
k	Kernel	K	Keep
l	Light	L	Lift
m	Memory	M	Move
n	No	N	Notice
o	Orientation	O	Open
p	Path	P	Proceed
q	Question	Q	Qualify
r	Reference	R	Return
s	Signal	S	Survive
t	Time	T	Transport
u	Use	U	Unfold
v	View	V	Verify
w	Wheel	W	Weigh
x	Crossing	X	Exchange
y	Yes	Y	Yield
z	Zero	Z	Close

The refusal mark

The pair (n, N) gives refusal its readable coordinate and receipt. $n =$ No is the reader-side sign of refusal; $N =$ Notice recognizes and records that sign. Gate/Fold carries the formal refusal of a typed candidate. Its declared refusals are nothing, noise, nuisance, negative, and annihilation. A receipt preserves the addressed candidate and its history for a later lawful comparison.

Proof status and audit

The registry contains three different kinds of claim. Keeping them separate is part of the closure.

Claim class	What is exact now	What remains field-specific
Finite registry	Counts, uniqueness, declared entries, and the presence of all required slots can be checked mechanically.	Whether a glyph is a good model of a particular empirical process.
Algebraic identity	Matrix multiplication, involution, composition, and declared equivalences can be proved symbolically.	The connection of an identity to a physical system.
Reader adapter	A scope packet can list reader, carrier, resolution, residual, and receipt.	Calibration, uncertainty, biology, apparatus behavior, and independent replication.

The companion program `lm_012_013_registry_check.py` verifies the finite portion of this edition:

1. exactly 10 decimal digits and their distinctness;
2. exactly 24 Greek letters and 24 distinct direct offices;
3. exactly 26 lowercase/uppercase English pairs;
4. distinct typed-null, set-empty, and decimal-zero representations;
5. $\binom{8}{2} = 28$, $7 \times 4 = 28$, and $\binom{8}{3} = 56$ for the shared eight-office finite reader.

The program is a receipt for the stated finite registry. It neither certifies a physical field model nor grants an empirical interpretation without its required native evidence.

What closes here

The alphanumeric closure is a closure of the visible formal interface. Every admitted layer has a declared domain and a readable job:

$$\begin{aligned} \text{decimal address} &\longrightarrow \text{Greek field office} \longrightarrow \text{Roman operator} \\ &\longrightarrow \text{English reader/action pair} \longrightarrow \text{receipt}. \end{aligned} \tag{8}$$

This gives a later reader a way to identify the mark, reconstruct its declared role, test its finite register membership, and locate the remaining proof obligation. It is sufficient to make the written layer inspectable; it leaves every physical, mathematical, linguistic, or computational adapter answerable to its own standards of demonstration.

The glyph is visible. The type is declared. The receipt remains.

References and internal records

1. Euclid. *Elements*. Classical construction of definitions, common notions, and propositions.
2. G. Peano. *Arithmetices principia, nova methodo exposita*. 1889.
3. G. Frege. *Begriffsschrift*. 1879.
4. C. S. Peirce. Selected writings on signs, relation, and interpretation.
5. A. Church. "An Unsolvable Problem of Elementary Number Theory." 1936.
6. J. von Neumann. *First Draft of a Report on the EDVAC*. 1945.
7. Unicode Consortium. *The Unicode Standard*; encoded character identity and interchange practice.
8. Coppalini Architecture. *Language Mechanics 000–012*; internal formal-basis series.

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