Alignment Algebra

Alignment algebra is an emerging mathematical language designed to operate within the generative process of *Infferus*—the infinite self-referencing structure of the true universe. Its purpose is to provide a systematic way to express, align, and transform the layered perspectives that appear throughout the recurrence process.

Unlike traditional algebra, which operates on well-defined quantities, alignment algebra manipulates *perspectives*—each representing a relational contrast such as length, mass, or time—rather than their absolute values. These perspectives coexist and interact through *layering*, *alignment*, and *contrast pairing*, allowing the structure of Infferus to be expressed and evaluated with formal precision.

The intention of developing this algebra is to enable more efficient computation and symbolic reasoning over the multi-layered structures that appear in Triogenesis, such as the recursive formation of straint frames, entropic alignment, and mass–energy equivalence. By introducing alignment rules, one can reduce or expand layers, observe equivalences between dual perspectives, and represent physical interactions as reconfigurations of reference rather than exchanges of energy.

This chapter presents only a glimpse of the core ideas behind alignment algebra. The system is still in development, and what follows should be viewed as a working prototype—a conceptual scaffold for a much broader formalism that will eventually integrate the operations of Infferus into a complete mathematical language.

Example: Alignment operation for entropy–temperature–energy relation

Speed, which represents the *pure length contrast* (unit c), can be expressed as a two-dimensional spacetime perspective in terms of distance L and time T:

$$[c] = [L, T]$$

Here, the square brackets [ ] enclose the *perspectives*, and the symbol "=" does not indicate ordinary algebraic equality. Rather, it denotes a *re-referencing operation* — the act through which all four inseparable primitive aspects of the formless whole are realigned within a specific context. Each "=" therefore has a contextual meaning; it is locally defined, not universal.

The perspectives are not traditional mathematical quantities such as numbers or vectors. Each represents a *contrast* that arises from the self-referencing of the formless whole and therefore always holds duality. For example, the expressions A/B and B/A describe the same perspective viewed from opposite orientations of reference.

We can now operate using *perspective relations*. For example, the relation between entropy, temperature, and energy can be expressed in two reference frames:

$$\text{First reference frame:} \quad [L_1 T_1] \times [M_1]$$

Second reference frame: $[M_2] \times \big[[L_4T_4] \times [L_2T_2] \times [L_3T_3]\big]$

The operation "$\times$" represents *coexisting alignments* within a reference frame. We may describe such coexistence as *layering*. Here, the layering proceeds hierarchically, layer by layer. For instance, M_2 layers with the pure-length volume contrast $\big[[L_4T_4]\times[L_2T_2]\times[L_3T_3]\big]$, while this volume contrast itself arises from the layering of three pure-length contrasts, each defined re-referenced to distance and time perspectives.

When M_2 operates with the layered term $\big[[L_4T_4]\times[L_2T_2]\times[L_3T_3]\big]$, the evaluation in terms of mass and speed becomes:

$$M_2 \cdot \frac{L_4}{T_4} \ \cdot \ M_2 \cdot \frac{L_2}{T_2} \ \cdot \ M_2 \cdot \frac{L_3}{T_3}.$$

Layers can be connected through new alignments, so the operation "$\times$" also represents the introduction of a new alignment within the reference frame. Such an alignment can turn certain relationships into observable forms while concealing others.

For example, we can layer the first and second reference frames by aligning L_1T_1 with L_4T_4. Through this operation we make $[L_1T_1] = [L_4T_4]$ observable, while the complementary relation $[L_1T_1] \neq [L_4T_4]$ becomes concealed. This alignment generates an inertial frame with a shared speed perspective ($[L_1T_1]$ and $[L_4T_4]$):

$$\big[[L_1T_1] \times [M_1]\big] \times \Big[[M_2] \times \big[[L_1T_1] \times [L_2T_2] \times [L_3T_3]\big]\Big].$$

Please note that all alignments within the Infferus framework are globally layered. The expression may be rearranged as long as the layered structure is preserved. For example, $\big[[L_1T_1]\times[M_1]\big]$ and $\big[[M_1]\times$

$[L_1T_1]]$ are equivalent, whereas

$$\big[[L_1T_1]\big] \times \Big[[M_1] \times [M_2] \times \big[[L_1T_1] \times [L_2T_2] \times [L_3T_3]\big]\Big]$$

represents a distinct layering structure.

To represent the relations in space and time, we must further layer a *tilted-room triangular alignment* among the perspectives

$$[L_1T_1], [L_2T_2], [L_3T_3].$$

This ensures that each pure-length perspective refers to a common cube edge length. These perspectives are therefore combined within a 15-straint *tiltable cube* possessing only three degrees of freedom. To reduce the original six degrees of freedom to three, we apply a *reductive perspective layering* in the form of:

$$\times \frac{1}{[L_4 \bigcirc]}$$

The full operation can therefore be expressed as:

$$\Big[[L_1, T_1] \times [M_1]\Big] \times \Big[[M_2] \times \big[[L_4, T_4] \times \big[[L_2, T_2] \times \frac{1}{[L_4, \bigcirc]}\big] \times \big[[L_3, T_3] \times \frac{1}{[L_4, \bigcirc]}\big]\big]\Big]$$

The symbol "○" indicates perspectives that are not yet reductively aligned. This reflects an important characteristic of *Infferus* and the recurrence world: additional layers of alignment can be introduced to undo or reshape previous ones. We have encountered similar examples in the *neutron sections* of the chapter on *Force*. Here, the same principle is expressed algebraically—the alignment can be *added* or *reduced*, analogous to multiplication and division in traditional algebra.

If we align L_2 and L_3 to L_4 in the reduction, the expression can be rearranged as:

$$\Big[[L_1, T_1] \times [M_1]\Big]_1 \times \Big[[M_2] \times \big[[L_4, T_4] \times [\tfrac{L_2}{L_4}, T_2] \times [\tfrac{L_3}{L_4}, T_3]\big]\Big]_2$$

The reduction here also carries an additional alignment meaning. We are applying a global reference distance layer to the volume contrast in order to introduce a new perspective contrast, $[L/L]$. As discussed earlier in the chapter *Earth*, the ruler of distances in our perceived world is anchored by the real spin—the 18-straint cube— which manifests as the hydrogen molecule bond distance b. Higher-order bond distances are built upon this same reference.

Thus, the perspective $[L/L]$ can be expanded as

$$[\frac{L, b}{b, L}]$$

Here $[b]$ encloses the 18-straint cube recurrence. It can be further expanded into layered descriptions of pure length or straintity (mass) perspectives. The infinite expandability of perspective is a key reflection of recurrence and *Infferus*, since each perspective represents the formless whole viewing itself through new layers of self-reference.

We have labelled the layers with subscripts 1 and 2, and can now introduce alignment between layer 1 and layer 2. We could mathematically align the two layers in both distance and time by re-referencing, so that $[L_1, T_1] = [L_4, T_4]$. However, this alignment is not directly observable, because what we actually perceive in space and time is the *speed*.

Since the volume contrast is already anchored by the distance ruler $[b]$, when we make the pure length perspectives of $[L_1, T_1]$ and $[L_4, T_4]$

equal, a cross-reduction alignment is required to conceal the independence of L and T, expressed as

$$\left[\frac{L_4, L_1}{T_1, T_4}\right].$$

This can be considered a contrast-coupled interface between layer 1 and layer 2. We need such contrast interfaces to align different perspectives — for example, to connect the volume contrast in the second layer with the expansion of speed in the first layer. We can call these *Perspective Map Layers* (or simply, a *Map*). Algebraically, a Map acts as a template.

For instance, the map here can be represented as

$$\left[\frac{L_4 L_1 M_2}{T_1 T_4 M_1}\right]$$

Note that the commas between perspectives are removed to indicate that the map has been re-referenced to our numerical system. Once re-referenced, the perspectives are no longer expandable, since our numbering system—which is predominantly two-based—carries within it both the observable and the concealed, chaotic autonomy of relationships along the number axis itself. This re-referencing therefore means that we transfer the expandability of perspectives within the Map into our numerical system, such as the number axis. One could also choose not to reduce the Map and instead continue operating within the expandable perspectives.

The template specify how the perspective contrasts are mapped to our numbering system. The underlying default projection is to cast the whole Map layer to a dimensionless unity, $\mathbf{1}$, on the number axis, unless stated otherwise.

We can see that our Map forms a balanced zig–zag ripple of perspectives between the first and second layers (the second layer is highlighted in blue). This balance is essential for casting stable numbers into our numbering system.

The final step in making the perspective measurable is to establish a reference for a global ratio of pure length— that is, the reference order of the reference frame, which maintains the constant speed of light (within the same recurrence room in our "corridor of recurrence" analogy). Applying a reduction alignment of $[\frac{1}{c}]$ introduces this reference. This reduction can be performed numerically, since c is commonly treated as a stable constant within our numbering systems.

The resulting template becomes:

$$\left[\frac{L_4 L_1 M_2}{T_1 T_4 M_1} \cdot \frac{1}{c}\right]$$

It is interesting to evaluate what becomes observable under this Map. The numerical operation can be carried out for the first and second layers separately as follows:

First layer:

$$\Big[[L_1, T_1] \times [M_1]\Big]_1 \times \left[\frac{L_4 L_1 M_2}{T_1 T_4 M_1} \cdot \frac{1}{c}\right] = \frac{L_1}{T_1} \cdot \frac{1}{M_1}$$

Second layer:

$$\Big[[M_2] \times \big[[L_4, T_4] \times [\tfrac{L_2}{L_4}, T_2] \times [\tfrac{L_3}{L_4}, T_3]\big]\Big]_2 \times \left[\frac{L_4 L_1 M_2}{T_1 T_4 M_1} \cdot \frac{1}{c}\right]$$
$$= \frac{L_4}{T_4} \cdot \frac{M_2}{1} \cdot \frac{L_2}{L_4 T_2} \cdot \frac{M_2}{1} \cdot \frac{L_3}{L_4 T_3} \cdot \frac{M_2}{1}$$

Note that $[\frac{L_2}{L_4}, T_2]$ and $[\frac{L_3}{L_4}, T_3]$ in layer two must first be aligned with $[L_4, T_4]$ in both L and T perspectives, before being mapped through $\left[\frac{L_4 L_1 M_2}{T_1 T_4 M_1} \cdot \frac{1}{c}\right]$.

We can identify the measurable quantity through a dimensional check. Using a simplified notation for the two layers, we write:

$$[\ \ ]_1 \times [\ \ ]_2 \times \left[\frac{L_4 L_1 M_2}{T_1 T_4 M_1} \cdot \frac{1}{c}\right] \sim \frac{M}{T^2} \cdot \frac{ML^2}{T^2}$$

The term $\frac{ML^2}{T^2}$ represents energy, but the first part, $\frac{M}{T^2}$, is not something we can measure directly. You may wonder why—after all, it seems that everything has been aligned. The interesting point is that we have not: one important alignment has been overlooked, right in front of us. That is,

$$[c] = [L_1/T_1]$$

or equivalently,

$$\times \frac{[c, T_1]}{[L_1]}$$

It is important to recognize that the familiar relation speed $=$ distance/time is not a natural property of the universe; it is a conceptual alignment imposed by our consciousness. When we include this alignment in the template, the quantities L_1, T_1, and c cancel. The first layer then becomes:

First layer:

$$\Big[[L_1, T_1] \times [M_1]\Big]_1 \times \left[\frac{L_4 M_2}{T_4 M_1}\right] = \frac{L_1}{M_1} \cdot \frac{T_1}{M_1}$$

The dimensionality of the combined perspectives of the two layers under this Map therefore becomes

$$[\ ]_1 \times [\ ]_2 \times \left[\frac{L_4 M_2}{T_4 M_1}\right] \sim \frac{ML^2}{T^2}$$

This corresponds to our reliably measurable quantity—*energy*.

The two layers we are operating on here each carry clear physical meaning when aligned through this Map.

The first layer,

$$\Big[[L_1 T_1] \times [M_1]\Big],$$

corresponds to *entropy*. It describes the alignment of mass perspectives with pure length (for example, straint path length). The longer the path length per unit mass, the greater the information capacity—expressed through bifurcation paths, loops, and recurrent structures. To evaluate entropy, alignments must preserve information without reducing the L and T perspectives. This allows us to understand the natural unit of entropy, the Boltzmann constant, as having the dimensional form LT/M^2, even without invoking temperature.

The second layer,

$$\Big[[M_2] \times \big[[L_4, T_4] \times [L_2, T_2] \times [L_3, T_3]\big]\Big],$$

corresponds to *temperature*. It represents the contrast of mass perspectives across pure length volume contrasts, under the alignment of space, time, and gravity (the tilted hyperstraint cubes) and the spatial distance ruler defined by the real spin (the 18-straint cube). From this, the natural dimensional form of temperature can be expressed as $(M/T)^3 \times L$. This expression is analogous to mechanical work ($F \times L$): temperature can therefore be understood as the self-referencing work the universe performs upon itself, measured relative to the molecular bond distances that stabilize L.

Finally, if we wish to cast the combined perspective onto the number system, we can symbolically write it as

$$[\,\cdot\,]_1 \times [\,\cdot\,]_2 \times \left[\frac{L_4 M_2}{T_4 M_1}\right] \times \left[\frac{1}{2}\right]$$

The layer $\times\left[\frac{1}{2}\right]$ indicates the adoption of the $\frac{1}{2}$ (or equivalently 2) perspective, which is expandable through the structure of the doubling constant d. Our natural number axis and the real number axis can therefore be understood as infinite recursive layerings of this $1/2$-and-2 perspective.

Thus, introducing the $\left[\frac{1}{2}\right]$ perspective signifies that the structure may be further expanded while the $\left[\frac{1}{2}\right]$ term itself remains approximately unchanged—because this perspective already contains an infinite chaotic autonomy within its recurrence. In this sense, it functions as an *infinite reservoir* from which further structures and perspectives may be drawn.

Summary of the Alignment Algebra Example

This example demonstrates how the method of *Alignment Algebra* reveals the pathway from fundamental recurrence structures to measurable physical and conceptual quantities. By layering and aligning distinct perspectives—such as pure length recurrence, the hyperstraint tilted cubes, and the real spin reference—we can trace how each alignment transforms abstract recurrence into definable quantities within consciousness, such as *energy*, *entropy*, and *temperature*.

In contrast to traditional mathematics, where operations are externally imposed, all defining, re-referencing, and alignment in *Infferus* and Alignment Algebra assume no external postulates; they are expressions of the universe folding itself. The completeness of relationships can only be concealed or revealed, but never excluded.

For this reason, each perspective remains inherently expandable. When operating through Alignment Algebra—such as when casting quantities onto the number axis—we must therefore remain aware of, and explicitly declare when necessary, which alignments are revealed as observables and which are concealed within the structure.

This prototype serves as a proof of feasibility. A more complete set of mathematical tools will be developed in the near future.