THE MEANING MODEL: CONSTRUCTING WORLDS AND STORIES AT PROGRESSIVE RESOLUTION

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ABSTRACT

The Meaning Model proposes a shared medium for constructing a world, its meanings, interpretations, and story together. A world can remain coherent at a coarse resolution for a declared purpose before its finer history is constructed. Opening that history must preserve declared commitments or explicitly revise them, including their dependent accounts and passages. The contribution is this coordinated authoring method, not a new record type or the storage of prose beside a graph.

Six record forms—Concept, Thing, Event, Binding, Cut, and Realization—support the method. Abstract meaning uses the same world machinery: a Concept may remain lightly specified or have canonical fragments whose roles and processes can be inspected alongside their instances. Semantic numbers are comparative commitments rather than freestanding scores. Each Cut names an Event parent, question, and unit, allocating one unit among exclusive answers and an explicit remainder. Ordinary process links remain unweighted; measurements retain external units. The modeled world, rooted Understanding Graphs, and document nodes share one address space without sharing authority. Event descriptions, concept groundings, reasons, and narration can therefore participate in one revision while retaining what each actually asserts.

The resulting workspace supports human or AI authorship and supplies a candidate training language: a learner could acquire how to choose, deepen, and repair representations, not only predict content within a fixed schema. Life Simulation develops the construction-to-learning loop and its tests; this paper specifies the representation and preservation contracts. The completed manuscript, *The Book of Conditions*, supplies a partial descriptive witness, not an end-to-end implementation or controlled comparison. Learned representation, computational savings, and alignment remain research aims, not results established by the construction.

Keywords Meaning Model, Recursive World Grammar, Concept Grounding, Event-Processes, Progressive Detail, Finite Resolution

1 Introduction

Reality does not arrive already divided into every "thing" to which people give a word. We identify a person's life, an expedition within that life, a marriage, an avalanche, a species, a recession, and a story. Each term makes some portion or pattern of experience addressable while leaving other variation in the background. The same evening of reading can belong to a person's biography, a book's history, human culture, biological evolution, and the physical history of Earth.

A boundary alone does not preserve reference. The same person may participate in a life, an expedition, a rescue, and a later conversation; those events need a stable way to state that they concern the same continuing individual. Conversely, a person may be opened into organs, cells, or devices for one question without discarding person-level identity. The difficulty is therefore not producing one description, but preserving identity and meaning when a description is opened, revised, compared with another world, or rendered into language. Ordinary prose can silently change what a term refers

to. A flat graph can store relations without stating how coarse and fine descriptions agree. An unqualified numerical rating can preserve neither who attributed it nor the sibling alternatives that give it meaning.

The Meaning Model proposes one grammar for those responsibilities. At a declared resolution, reusable Concepts are coupled to continuing Things and Events. Cuts open question-relative structure while a remainder keeps the unknown or deliberately unresolved visible. A Concept may remain lightly specified or be grounded in a canonical world fragment written in the same grammar. Finer articulation reuses the same identities and must respect what has already been committed.

The representation is intended for narrative worlds, simulation and knowledge systems, corpus annotation, and perspective-separated accounts of people. Across these uses its job is the same: preserve which entity and meaning a statement addresses, which typed ancestry locates it, and how a finer description relates to a coarser one. These are possible uses rather than benefits guaranteed by the grammar.

The grammar is a representational substrate rather than an annotation shell around a finished simulator. A model is complete only relative to a declared question and resolution. Domain-specific processes, measurements, and laws may be attached without becoming new universal record forms. Minimality is therefore measured against the distinctions a validator must preserve, not against a metaphysical claim about the world's ultimate furniture.

The immediate value is a working model that helps an author decide what happens, not just catalogue a finished story. A whole life or institution can be sketched first, then opened where its decisions and consequences matter; incompatible detail prompts revision of the larger account. This external semantic workspace supports human or AI authorship, exercised by the Book at a bounded resolution.

Progressive resolution and a shared construction medium are the proposal's two linked architectural contributions. They organize four representational changes:

- **Construct detail under commitments.** A useful world can precede its finer history. An opening preserves declared coarse answers or makes the necessary revision explicit; it does not merely reveal precomputed detail.
- **Revise the account across surfaces.** World state, abstract concept models, Event descriptions, document text, and externalized understanding participate in one authoring operation. Exact dependencies identify which interpretations, reasons, and passages a changed commitment puts in question.
- **Construct meanings as well as instances.** A concept can be articulated through the same roles and processes as a situation that realizes it. Definition, application, and revision become inspectable operations, without requiring deep grounding for every concept.
- **Give semantic numbers their comparison context.** A numerical judgment retains its question, alternatives, remainder, and perspective. Measurements keep external units; concurrent processes do not become shares merely because they describe one person or world.

These changes act together. A character's comparative wants and appraisals can guide a decision before a scene is written. Opening the decision may reveal that the proposed action does not fit what the character could know, prompting revision of the action, its explanation, or the larger plan. A changed concept definition can instead require reassessing what the action exemplifies without changing the action itself. The proposed novelty lies in coordinating these operations, not in any record form alone. Each surface retains its own authority and refinement rules, and the person vocabulary remains replaceable.

A recurring descriptive pattern links these resolutions: an established process encounters a consequential Event, and its subsequent organization changes. Where agents anticipate the Event, preparation or avoidance can begin earlier. The same questions can organize a daily encounter, a life, or an institutional history without assuming that all three obey one dynamical law.

Progressive resolution also offers a computational possibility for interactive worlds: keep most of the world coarse but consequential, and construct finer detail where interaction requires it. This is not merely displaying a small part of an already detailed simulation. Some of the finer state and history have not yet been constructed. Opening them must preserve the commitments protected by the selected profile, including recorded observations and shared facts accessible to different players, under its declared checks and tolerances. The benefit sought is less unnecessary construction without losing the coherence required by those interactions, not exhaustive microscopic simulation out of sight.

For example, a regional harvest failure may constrain a town's supply without specifying every household or warehouse. A player's visit can require opening one warehouse's inventory and staff; a conversation can then require one worker's

experience of the shortage. The coarse supply commitments and any selected domain rules constrain these openings without uniquely determining them. A distant disruption may still require a coarse update before anyone visits, and a later visitor must encounter a history compatible with what was already observed, including any intervening changes. Detail that fails the declared checks is rejected or requires an explicit revision of the affected commitments; returning to a place does not license silently replacing its history. Whether such selective construction yields a net computational saving at comparable fidelity remains to be tested; the Book does not measure that benefit.

A further hypothesis is that a learner can acquire these representational practices, not merely consume their finished products. Worlds, observations, and construction histories could form a training language for learning to identify persistent processes, open useful distinctions, and revise an account when later evidence contradicts it. The learning target would include choosing what to represent and when to change the questions, rather than only assigning values within a fixed vocabulary. External records would remain inspectable; the learner need not reproduce their syntax internally. Whether these practices improve prediction, generation, or transfer is an empirical question. Life Simulation develops the learning and transfer methods for testing it [1].

This is a program of representational compression: use few domain-neutral forms while retaining the distinctions a task needs. A new scientific or social domain should normally add content and external models, not enlarge the common record inventory. The aim is consequently broad in scope but finite in every construction; it is not a promise to compute the universe at maximum detail.

The scope includes attributed inner life. Beliefs, feelings, wants, and private interpretations may be represented without turning a character's report, an observer's estimate, and accepted public state into one claim. Accepted world Events descend from History; an attributed interior Event additionally descends through the relevant person's lifecycle and inner-process root. This ancestry preserves the boundary without making private experience directly observable or selecting one universal psychology.

Refinement should preserve semantic continuity. Starting from the coarse claim that Babbage builds an Engine, a construction may later expose the machine's parts, its workforce, or competing accounts of the work without changing which Babbage, Engine, or building process earlier records addressed. Unopened regions can remain coarse; openings must fit the accepted boundary or revise it visibly.

The claim has two parts that must not be confused.

- **Recursive refinement** is a property of the world grammar: every finer articulation uses the same records and the local contracts of its declared construction profile. A deeply grounded concept may reuse that grammar as a canonical model, but need not do so.

- **Finite-resolution sufficiency** is a constructive hypothesis: for a declared purpose and tolerance, the distinctions required by the task can be represented through those records without claiming that the representation is unique, complete at every resolution, or mechanically true.

The paper also owns the construction discipline required to build all three surfaces together: frozen-parent whole candidates, direction rolls, atomic commit or rejection, explicit revision, rendering routes, and read-back. Life Simulation studies how process histories are generated, advanced, inferred from observations, and learned, including comparisons of candidate temporal laws [1]. A compact law is optional, not a condition of using the representation. The boundary is one of responsibility: the Meaning Model specifies what records mean and how proposed changes preserve or explicitly revise a world; Life Simulation develops methods for producing those changes and testing their predictive and learning value. When combined, they operate throughout an ongoing construction. Life Simulation's methods therefore include advancing coarse processes, deciding when finer resolution is needed, and evaluating the cost and fidelity of those choices; the preservation and revision contracts remain the Meaning Model's part.

The proposal combines explicit character-state modeling before prose generation with recursive conceptual decomposition from Fractal Intelligence [2]. The resulting question was whether reusable meaning, continuing identity, changing Events, attributed understanding, and the text that renders them could occupy one construction without becoming one undifferentiated node type.

The minimized core. Six forms carry the world model: Concept, Thing, Event, Binding, Cut, and Realization. Bindings give Things roles in Events, while typed links connect records without turning every connection into the same relation. A Cut answers one question by dividing one stated unit among exclusive alternatives and a remainder; those shares total one. A Realization links a Concept to an addressable fragment without a weight, and any graded fit is expressed by a separate Cut on an assessment Event. The six forms keep identity, occurrence, participation, decomposition, and grounding apart without claiming to exhaust metaphysics. A construction profile may add lifecycle, admissibility, and recomposition rules while retaining the same forms. Understanding Nodes and Document Nodes share their address space with world records but keep distinct authority and validation, and perspective follows declared authority ancestry rather than a duplicated attribution field.

2 Grammar and Progressive Construction

The core is minimized at the level of record forms, not vocabulary labels. It uses six forms—Concept, Thing, Event, Binding, Cut, and Realization—and introduces a new form only when no existing form plus typed fields can preserve a distinction that a validator must enforce. This is relative minimality under the declared contract, not a proof of globally minimal syntax or metaphysical primitives.

The definitions and rules needed to use this account are stated in this paper. The separately typeset *Minimized Grammar* collects them as a compact reference; it does not add requirements. Core obligations and selected-profile rules retain the same status in both presentations.

```
Concept { id, names, typed relations, constraints,
    grounding records, provenance }
Thing { id, kind, identity boundary, continuity criterion,
    typed links, provenance }
Event { id, kind, interval, typed world data, optional description,
    direction, typed links, provenance }
Binding { id, event, role, thing, interval, provenance }
Cut { id, parent Event, question, profile, divided unit,
    keyed weighted answers, keyed remainder, optional conditioning address,
    constraints, provenance }
Realization { id, purpose, context parent, target, concept,
    grounding version, optional alignment, evidence, provenance }
```

Answer and remainder addresses pair the Cut revision with a local key; they are not additional record forms.

A reference distinguishes a logical identity from an exact record revision. In the selected immutable profile, an edit creates a successor revision, not a new Thing or Concept identity. Provenance records the author or generator, commit, construction time, and evidence references. Times name their clock: Event chronology, construction history, or document order. Derived views retain their source revisions and derivation lineage rather than acquiring independent authority.

Each form answers a question that the others cannot answer without erasing a distinction or relocating its responsibility. A Concept says which reusable meaning is intended. A Thing says which continuing instance is addressed. An Event says what persists or occurs. A Binding says which Thing fills which time-scoped role. A Cut says how one declared unit divides under one question. A Realization says which Concept grounds an addressable world fragment. The fragment is a subgraph of existing records rather than a seventh world form.

The removal test concerns these responsibilities, not their serialization. Removing Thing identity requires another way to join a person's appearances; removing Binding requires another way to distinguish that person's roles; removing Realization requires another way to distinguish a concept definition from its application. The same test applies to occurrence and allocation. Another schema may combine these forms while retaining equivalent typed information. Thus six is a compact, inspectable interface, not a lower bound on every possible encoding; complexity in field types and validators counts against the claim just as additional record forms would.

Relations are carried in four ways. A Binding assigns a Thing a typed, time-scoped role in an Event. A Cut relates a parent to weighted child answers and a remainder under one question and unit. Typed relation fields connect Concepts, Events, records, or typed world-data fields under declared kinds. A Realization grounds a world fragment in a Concept for a declared purpose. Each carrier retains the target, authority, clock, inference, and validation contract of its relation kind.

A relation among several Things is consequently a joint Event with one Binding per role, not a direct binary edge between the Things. Typed links such as `contains`, `about`, `updates`, and `supersedes` are sibling kinds, not synonyms. `contains` asserts scoped Event–Event containment; `about` is reference without participation or state change; `updates` names an affected process or typed world-data field changed by an Event; and `supersedes` preserves a predecessor while changing a typed lineage. A supersession must name its scope and clock, because replacing a character's earlier belief in story time is not the same authority operation as superseding an author note or a model commit in construction time.

A Realization is an attributed, unweighted grounding link. A *define* realization associates a Concept with an idealized grounding model or family. A *describe* realization applies a recorded grounding version to a token fragment. Its context parent is an Event or surface node; it retains provenance, available evidence, and any explicit role alignment. The relation is many-to-many: one fragment may be linked to several Concepts, and one Concept may be linked to many fragments under different perspective paths and at different times. When a graded claim is made, an assessment Event under the relevant ancestry carries a local Cut whose mutually exclusive answers are *matches*, *does not match*, and remainder. Separate Concepts use separate fit Cuts; no independent Realization degree is introduced. Every Cut is parented by an Event. A judgment about a fragment, Concept, or another record therefore introduces an assessment Event linked `about` that target and contained beneath the process whose perspective it expresses; the target itself is not silently treated as a Cut parent.

Cut answers are addressable components: a reference names the Cut revision and a stable local answer key, even at zero weight; the remainder has its own reserved key. An answer's target and its component address are distinct, since the same Event may answer several questions. Nested Cuts name the particular component whose conditional unit they divide. Conditioning addresses must resolve and cannot form cycles. This supplies exact targets for refinement, grounding, and notes without adding another world record form.

The query contract is ancestry-complete within the caller's authorized view. Only declared authority-parent edges confer context: `context-parent` links and containment links explicitly assigned that role. They form an acyclic graph. Traversal stops at the nearest declared context root on each path: accepted-world, inner, understanding, document, or candidate. All such paths must resolve to the same governing root; conflicting roots require separate claims, not an arbitrary parent choice. Temporal ancestry is queried separately.

Access is checked before following an edge or returning its target. A denied private reference reveals neither content nor private ancestry. Reference, evidence, `renders`, and Realization target links do not grant access; following `about` never changes perspective. A lookup returns the permitted typed parent paths. A Cut or component lookup returns its parent Event, question, unit, keyed siblings, conditioning address, remainder, and recomposition rule together, or withholds that entire view. It never exposes an isolated weight whose required context is inaccessible.

The parsimony rule is operational: admit a new primitive only when a validator would otherwise be unable to distinguish two cases with different admissible targets, composition, authority, inference, or validation. A new name may be introduced when it helps a reader or validator, but shared serialization never implies shared semantics.

2.1 Optional construction profile

The six forms do not by themselves require one lifecycle convention, temporal partition, or domain vocabulary. This paper uses a stronger profile to show how they can construct a progressively resolvable world. Other profiles may choose different children and depths or omit human modeling entirely. What remains general is the Cut contract: a decomposition names its parent quantity and question, admits mutually exclusive answers under that question, retains a remainder, and states how the answers reconstruct the parent.

The reading rule is simpler. A semantic number is a Cut weight: it means one answer's share relative to its siblings under the parent Event's question and unit, and the answers plus remainder sum to one. A non-summing process relation is unweighted. Literal dates, durations, counts, currency amounts, positions, and other externally grounded observations may be stored as typed Event data with their units and provenance, but they are not semantic ratings and do not create a third parent relation. A Realization is likewise unweighted; optional graded fit is represented by its own local Cut. If no divided unit and mutually exclusive answers can be named, no semantic number is assigned.

Three Cut families—allocation, sequential, and direction—yield five named profiles: facet, contribution, cause, sequential, and direction. Their validator-visible distinctions are specified in Section 2.2.2.

The construction interface exposes six operation families. They are a small authoring surface over the records, not six additional ontological primitives.

Register stages an addressable Concept, Thing, or Event; in the lifecycle profile a new Thing and its lifecycle enter the same candidate. *Bind* assigns a Thing a time-scoped role in an Event. *Open or compose* is one structural family with two retained modes: open refines a frozen authoritative parent, whereas compose proposes a new parent over existing Events. *Cut* adds question-relative answers under one declared profile. *Decide* rejects a candidate, commits it as new, or commits an immutable revision that records superseded targets and revalidates its dependency closure. *Realize* defines or describes Concept grounding while retaining purpose, version, context parent, evidence, and uncertainty.

Convenient construction names specialize those families without enlarging the record grammar.

Construct	**Core or interface basis**	**Why the name remains**
Facet, contribution, cause	Allocation Cut	Their answer eligibility, interpretation, and validation differ
Presence, membership, part–whole	Event plus typed Bindings	Their roles and interval constraints support different queries and validators
Update	Event plus `updates` link	It asserts an effect on a process or typed world datum rather than generic reference
Supersession	Typed `supersedes` link	Its scope and clock determine which lineage changes authority
Roll	Direction Cut plus Decide	The original forecast, seed, fixed mass, drawn mass, and alternatives must survive selection
Roster, inherited presence, summaries	Read-only derivations	They follow from committed records and carry derivation lineage rather than new authority
Understanding, render, read back	Understanding and document workflow	They operate on linked text surfaces outside the six world-record forms

Table 1: Named conveniences built on the minimized record grammar.

Five cross-record rules govern this profile.

1. Nonnegative, mutually exclusive Cut-child weights and the explicit remainder sum to one under the declared question and unit.
2. Qualified decompositional refinement satisfies its profile-specific composition operator within tolerance, or the candidate is rejected or committed as an explicit revision.
3. Containment and sequential children respect their applicable parent temporal or spatial extent; direction candidates instead respect the forecast horizon and are not treated as present parts.
4. Every active Binding interval lies inside its Event and the lifecycle of each actively participating Thing; an `about` link does not imply participation.
5. A Cut inherits the governing authority context of its parent Event; a different perspective requires another attributed Event beneath the corresponding typed root and another Cut.

Every authored profile record carries provenance, and every derived view carries derivation lineage. A concrete construction may add stronger gates, including co-presence checks and a rationale requirement for selected changes. Those gates must be declared by that construction; they are not universal laws of every domain represented by the core.

2.2 Progressive world construction

The optional profile used here adds lifecycle anchoring and conservative refinement to the core. It illustrates one way to build a world; its conventions are not required of every Meaning Model.

2.2.1 Roots, identity, and relations

The profile distinguishes two roots. The Universe is a Thing that addresses the continuing identities in scope. History is its lifecycle Event and contains the accepted Events within the declared horizon. Time is carried by Event intervals and typed temporal data, not represented as another Thing. Merely assigning a date to a candidate does not place it in accepted History.

Each Thing names an identity boundary, a continuity criterion, and exactly one lifecycle Event in this profile. The Engine may therefore remain the same Thing while its location, ownership, completion, parts, and social interpretation

change. An active participant Binding must lie inside the participant's lifecycle. Later Events may still refer to a destroyed machine or a dead person through `about`; they do not bind that Thing as an acting participant. Creation and destruction delimit lifecycles. Split, merge, replacement, and succession Events link predecessor and successor identities, while the declared continuity criterion decides whether either is the same Thing. Resolved intervals are half-open, $[t_0, t_1)$. A moment Event has a tagged instant with support $\{t\}$, not a positive duration. Creation and destruction use declared boundary roles; ordinary participation cannot outlast a lifecycle. Unknown endpoints remain unknown: unresolved interval checks are *untestable*, not passed. Duration shares require a finite observation interval. Imagined and counterfactual timelines declare their own frames; temporal containment and comparison require a common frame. A changed lifecycle claim is an immutable revision, not a second current lifecycle for the same Thing.

Relations among Things are Events because a relation can have a beginning, an end, participants with different roles, and its own history. Membership is a joint Event with member and group Bindings. Physical part–whole uses part and whole Bindings under a different relation kind. A partnership uses two partner Bindings. This makes n-ary relations possible and avoids maintaining a second, timeless graph of Thing–Thing edges.

Rosters and encapsulation are views over active relation Events rather than independently authored truth. At time t, the view selects physical parts, members, or occupants whose relation Event and role-Binding intervals both contain t, retaining those different roles. Opening the Engine exposes parts without replacing the Engine: joint part–whole Events expose the parts and Thing identities preserve reference. A share of credit or activity is a separate Cut under a declared question; it is never inferred from membership. Likewise, a dispute may compose several letters, meetings, and departures into one episode without becoming identical to the partnership in which it occurs.

Space uses the same forms. A place is a Thing and presence is an Event binding a subject to it. When geometry matters, position and extent are typed Event data with a coordinate frame, unit, tolerance, and provenance. A sphere around a building records modeled size, not semantic resolution or uncertainty about its location. An explicitly location-propagating physical-part relation may derive a part's coarse presence from its container until detachment; social membership does not imply co-location.

Individual Cuts can be drawn as trees, but the world is a graph. One Event may participate in several Cuts, Processes may overlap, and distinct inner or understanding roots may represent incompatible readings of the same Thing. Shared identifiers keep these views about one world without giving any node a global weight.

Four frequently confused openings therefore have different tests. Table 2 makes those tests explicit. None can stand in for another merely because all four can be drawn as parent–child diagrams.

Relation	What the children mean	Required connection
Concept specialization	More restricted kinds of the parent kind	Declared inherited constraints; no normalization
Expressive concept decomposition	Components used to articulate one grounding	Named comparator and fine-to-coarse mapping; a Cut only for a divided unit
Physical encapsulation	Parts of the same material Thing	Time-scoped part–whole Bindings, identity, and any declared extent constraints
Temporal segmentation	Disjoint portions of one Event interval	Coverage, interval order, and duration-derived sequential shares

Table 2: Different meanings of opening, with different preservation contracts.

Progressive resolution needs a stopping rule as much as an opening rule. Make a record explicit when it must persist across later construction, constrain a later Event, differ across perspectives, or remain controllable and auditable. Otherwise the detail remains implicit at the declared purpose and resolution. Where a governing Cut exists, its unallocated share stays in that Cut's remainder; an unweighted process or relation acquires no fictional remainder. This rule does not guarantee that the chosen frontier is optimal; it prevents detail from expanding merely because it can.

2.2.2 Cuts, Event-processes, and world data

The central numerical distinction is not between important and unimportant records. It is between a divided quantity and an undivided relation. For Cut K,

$$w_i \geq 0, \qquad w_\perp \geq 0, \qquad \sum_i w_i + w_\perp = 1. \tag{1}$$

Each w_i is meaningful only beside its siblings under the Cut's parent Event, question, and unit. The answers must be mutually exclusive as shares of that unit even when the records they reference coexist. The same Event can receive different weights under different questions; the grammar assigns it no global importance. If increasing one proposed answer need not reduce another and no competing unit can be named, the relation is not a Cut.

Table 3 states the complete boundary. The first two rows are the two ways a parent may be opened. The third is data carried by an Event, not another parent relation.

Form	Question answered	Representation	Weighted?
Cut	How does one declared unit divide?	Exclusive answers plus explicit remainder	Yes; sums to one
Event-process	Which Events occur within, constitute, update, or refer to this longer Event?	Typed containment, update, and reference links	No
World datum	What categorical fact or externally measured value held?	Typed Event payload with unit, frame, uncertainty, and provenance	Not a parent relation

Table 3: Two parent relations and the separate world-data payload.

The five named profiles fall into three families. An *allocation* Cut divides a unit among answers in a frozen vocabulary or among referenced records. Facet answers use the frozen vocabulary; contribution answers name Things bound to the parent Event; cause answers reference existing wants, beliefs, actions, circumstances, or Events. A cause Cut remains an allocation of explanatory responsibility located beneath one perspective-bearing process; normalization does not establish intervention-level causality. Overlapping contributions require an explicit allocation convention or a joint answer; assigning each the whole shared contribution would double-count it. A *sequential* Cut orders disjoint child Events and derives their shares from duration, leaving uncovered time in the remainder. A *direction* Cut divides forecast allocation among mutually exclusive continuations at a stated horizon. Its children are possible successors rather than current parts, and its interpretation must be declared before selection or outcome. Proposal weights specify how a constructor samples; predictive weights assert probabilities over a defined outcome partition. Predictive calibration is then evaluated, not assumed from normalization, and an uncalibrated forecast can still be scored. At most one answer is realized; its accepted Event uses a `realizes-forecast` link to that answer's slot, including the remainder. Unrealized alternatives do not thereby become accepted Events.

An Event's general direction may instead reference a constraint, transition law, or learned predictor. Such domain models are content attached to the grammar. How they are proposed, compared, and trained belongs to Life Simulation; their presence does not enlarge the six-form ontology.

The slogan that children define their parent is consequently qualified. Cut children divide one stated unit; a direction Cut describes alternatives, not parts of a future that has already occurred. Shorter Events may constitute or alter a longer process without summing, and one Event can update several processes at once. Dates, money, distance, and measured physical change retain their own external units. An actor or reasoner may later pose a Cut over explanatory responsibility, but the grammar never manufactures a common magnitude merely because several domains changed together.

A Thing's lifecycle Event can host several concurrent, overlapping Event-processes. A person's body, partnership, work, or place processes, for example, can change together without becoming fractions of one life-wide quantity. Ordinary links state containment, occurrence, update, or reference; they do not themselves explain the longer process. Explanation requires a causal Cut beneath the reasoner's typed ancestry or an anchored UnderstandingNode. When a construction calls one process slow and another fast, those words name response time at a declared temporal resolution, not importance or a numerical rank.

2.2.3 Conservation under refinement

An opening is conservative only with respect to a declared contract. Before generating detail, the constructor fixes a base snapshot, protected queries at specified times and resolution, admissible error, and a map from proposed fine records to coarse records or Cut components. A typed *Close* operation reconstructs the protected answers from addressed fine records through that map; reading cached coarse answers does not count. Identity, categorical data, and protected links normally require exact agreement; measurements use same-unit tolerances. Acceptance requires each protected answer to agree with the base within its declared tolerance, as well as satisfying the structural constraints. Otherwise the proposal is rejected or submitted as a revision. Close is a validation operation, not a seventh record form, and cannot be chosen after seeing which projection makes a candidate pass. This is a finite preservation witness, not a theorem that every possible query or meaning remains unchanged.

Suppose a finite, positive-duration parent Event P has a sequential Cut into disjoint intervals I_i. Their shares are

$$\lambda_i = \frac{\mu(I_i)}{\mu(I_P)}, \qquad \lambda_\perp = 1 - \sum_i \lambda_i, \tag{2}$$

where $\lambda_\perp$ covers time not yet opened. An open lifecycle uses an explicitly bounded observation Event rather than an infinite or unresolved denominator. Compatibility requires the same question, divided unit, vocabulary, remainder meaning, and governing perspective. If the children fully cover the parent and every interval has a compatible facet Cut f_i, the parent Cut is

$$f_P = \sum_i \lambda_i f_i. \tag{3}$$

When $\lambda_\perp > 0$, a complete parent vector exists only if the uncovered interval has an explicit compatible facet vector $f_\perp$, in which case its term $\lambda_\perp f_\perp$ is added. Otherwise the derived view reports the known partial contribution, coverage, and temporal remainder without inventing the missing vector. If a complete parent p was already committed, partial detail must still leave a feasible completion. In exact arithmetic,

$$r = p - \sum_i \lambda_i f_i, \qquad r_j \geq 0 \text{ for every } j, \qquad \sum_j r_j = \lambda_\perp. \tag{4}$$

The construction fixes any numerical tolerance in advance. A child cannot consume more of a parent component than was committed, even while other time remains unopened. A feasible residual establishes only that completion is possible, not what actually happened during the gap. Full coverage reduces to the mixture equality. Failure requires rejection or an explicit parent revision with its affected dependents; normalization must not conceal it.

For a numerical check, take two equal-duration intervals with compatible Cut vectors $(.30, .60, .10)$ and $(.10, .80, .10)$, where the third entry is each Cut's remainder. Their parent is

$$\tfrac{1}{2}(.30, .60, .10) + \tfrac{1}{2}(.10, .80, .10) = (.20, .70, .10).$$

The calculation conserves sibling-relative shares; it does not turn the categories into absolute measurements.

Only compatible Cut questions use this mixture. Relationships, presence, categorical lifecycle status, material stocks, and other topologies retain their own aggregation rules. For an allocation, Close sums fine shares mapped to each coarse answer; opening a remainder must account for that same remainder's mass. A conditional Cut distributes its enclosing component, so its full-unit shares are the enclosing weight times its local weights. For physical encapsulation, Close preserves protected identity, role, presence, and extent queries; for temporal segmentation it preserves interval coverage and declared ordering. These are different operators. A finer gear description can preserve the machine's identity and location without claiming to be an average gear.

Life, period, episode, and phase illustrate the distinction without adding record forms. A lifecycle is an Event bound to one Thing. Periods are the disjoint children of one authoritative sequential Cut of a bounded lifecycle interval. An episode is a coherent Event arc linked `occurs-within` a lifecycle or period and may overlap other episodes or cross period boundaries within its lifecycle. Its phases, when opened, use a sequential Cut of that episode. A Book construction may use these forms without treating its particular periodization or person vocabulary as part of the grammar. The selection, comparison, and learning of temporal process laws belong to Life Simulation.

2.2.4 Anticipation, shocks, and adaptation across scales

Longer processes supply the circumstances in which shorter Events matter. A shock is an Event that materially changes a specified process at the chosen resolution, under a declared criterion of change. It need not be harmful or unexpected: an invention or successful demonstration can reorganize a life as substantially as a loss. The same Event can affect a person, a partnership, and an institution differently. These are linked responses, not copies of one shock magnitude assigned to every participant.

Anticipation is optional and perspective-specific. A prior belief or predictive direction Cut records what an actor expected at a stated cutoff and horizon; preparatory Events record what the actor did about it. Constructor proposal weights are not evidence of that expectation. An anticipated loss can still be severe, while a surprise can have little lasting effect. Missing prior records mean that anticipation is unknown, not zero. A society or ecosystem need not have one mind: forecasts belong to named actors or models, and any collective account declares its aggregation. Preparation can avert, reduce, or amplify the subsequent disturbance.

Adaptation is represented by response Events and changes in the affected processes, with descriptions and anchored UnderstandingNodes explaining the proposed connection. It need not restore the old state or improve matters. Recovery, consolidation into a different way of acting, continuing instability or cascade, and terminal transition are possible shapes. Anticipated transition allows adjustment before the focal Event. Growth, learning, and aging can also accumulate through drift without a discrete shock. Beliefs, wants, skills, relationships, and resources may change at different rates; one person's recovery can coexist with an institution's closure.

The recurrence is a pattern of questions, not an assertion of exact self-similarity. Over decades, economic or political change can alter an institution's possibilities; over years, people reorganize careers and relationships; within a day, an interruption changes a plan or conversation. Larger processes constrain local options, while accumulated local responses can alter the larger process. Spatial reach and response time are separate: a brief decision can have widespread, lasting effects. Update links and anchored explanations express these connections; containment or a duration-weighted mixture alone does not establish their cause. Only genuine allocations use Cuts, and only compatible questions recompose numerically.

No new record or mandatory stage sequence is required. Jump diffusion may suit some continuously varying states with abrupt changes, but diffusion is not a synonym for adaptation, and not every process returns to a baseline. The Meaning Model records the before-state, any anticipation, the Event, and its responses; testing temporal laws or predictors against those records belongs to Life Simulation.

3 Concepts and Examples

Stable Concept identities, typed relations, versioned grounding resources, and local fit Cuts support both light vocabularies and deep canonical fragments.

3.1 Concept identity and grounding resources

A concept first needs a stable identifier. Names can change, collide, or be translated; the identifier lets a world continue to refer to the same proposed meaning. Typed relations then place that identifier in one or more conceptual views. A concept may specialize another concept in one hierarchy, oppose a second concept, and help express a third without those relations becoming the same generic parenthood.

This relational representation can be intentionally light. A frozen emotion vocabulary, for example, may need only names, short constraints, typed relations, and anchors. Its position in a tree does not exhaust its physical meaning, but a construction should not be forced to author a miniature world for every term before it can begin.

Four resources can represent and ground a concept with increasing explicitness. They can coexist, and a construction need not treat them as rival definitions or as a mandatory maturity ladder. The first organizes identity and relations; the others add progressively richer evidence or structure.

1. **Relational schema.** The concept is constrained by its name, typed parents, differentia, neighboring relations, and the question under which it is used. This is the cheapest form and may be sufficient for use inside a frozen local vocabulary, although taxonomy alone does not specify how the concept is physically realized.
2. **Representative prototype.** One provenance-bearing fragment is selected as a useful center of comparison without being declared the full extension of the concept. Different contexts may require different prototypes under the same stable Concept identifier.
3. **Exemplar grounding.** The concept points to provenance-bearing positive, negative, typical, and boundary examples. Anchors make a graded judgment comparable without pretending that one example is the definition.
4. **Canonical-model grounding.** One or more idealized referent–event models written in the Meaning Model grammar state characteristic roles, things, event-processes, phases, and cuts. This is the deepest option when temporal or relational structure must be inspected directly.

An operational layer may add a recognizer that proposes a *describe* Realization and any component or aggregate fit Cuts from a world fragment, or an instantiator that proposes a fragment from desired realization conditions. Both retain their version and provenance and use the ordinary realization or candidate-commit interface. Their omission from a construction is a profile choice, not a restriction of the theory. This links the construction of an example, the explanation of its concept membership, and the revision of that concept through one representational medium. Learning those operators is a further task, not a consequence of making their inputs explicit.

A canonical grounding is a family rather than necessarily one prototype. It may retain context-specific models, counterexamples, boundary cases, and unresolved variation. Any numerical typicality claim is expressed by a local Cut rather than an independent scale.

Define Realizations and typed links associate a concept with these resources. A describe Realization records the comparison actually used: exemplars consulted, or a canonical alignment with component and aggregate fit Cuts under the relevant assessment Events. The comparison is never implicit.

Examples constrain a concept without uniquely fixing how it should extend to a new case. A prototype selects one representative center; a canonical family makes more relational and temporal commitments explicit; and a recognizer adds a learned decision rule. Each can still be incomplete or culturally local. Consequently, moving from examples to a canonical family and then to an operator is a possible learning path, not a proof that the resulting concept is the only correct one.

If a definition process allocates attention or responsibility across a canonical model's components, a definition or assessment Event about the model parents that Cut beneath the process. Normalization applies only when its answers are mutually exclusive shares of one named unit. Overlapping senses or perspectives remain typed concept relations or separate Event-parented Cuts. The existence of canonical models does not by itself supply an operator by which their world fragments recompose.

3.2 Content-addressed grounding versions

A Concept identifier and a grounding version answer different identity questions. The identifier preserves the proposed concept across revisions. A grounding version identifies the exact definition bundle used for one Realization. A flat bundle may contain the identifier, description, relations, prototype or exemplar references, and constraints; a deep bundle may contain a canonical fragment and comparator specification. Either kind may be serialized in a declared canonical form and addressed by its full Sema content hash [3]. A revision produces another hash and an explicit `supersedes` link. The Concept identifier remains only when its declared continuity policy treats the revision as the same concept; a semantic split or merger normally introduces linked successor identifiers.

Content identity is narrower than semantic identity. Equal digests under one canonicalization scheme establish that two parties resolved the same canonical representation; they do not establish that differently encoded models have different meanings, that the selected model is true, or that two perspectives accept its interpretation. Human-readable shortened handles are therefore references, not the authoritative identity. The full digest and canonicalization version remain in the record.

Reproducible fit Cuts require the hashed or transitively addressed bundle to name everything that can change the comparison. For a flat grounding this includes its descriptions, relations, anchors, and constraints. For a canonical grounding it additionally includes the fragment, role schema, component and aggregate Cut questions with their answers and remainder, referenced grounding versions, and comparator or recognizer version. A *describe* Realization then states exactly which bundle it used. Sema provides addressing and agreement on that bundle; the Meaning Model continues to carry context ancestry, evidence, alignment, and the claim made with it.

3.3 A model of concept history

The idealized fragment used to define a concept is not automatically an event in the history of a modeled society. When the development of the concept itself matters, the same grammar can instead model its historical carriers. A formulation, notation, published definition, or versioned canonical bundle is registered as a representational-token Thing linked to its Concept and grounding hash. Its lifecycle and joint Events can then record formulation, naming, publication, adoption, contestation, revision, or abandonment, with people, documents, and institutions bound in their respective roles. A split or merger of definition artifacts is recorded at this level; when the asserted meaning itself divides or combines, linked successor Concept identifiers make that semantic claim explicit. The Concept record remains a Concept; it is not silently converted into a Thing.

This evidence-indexed subgraph can be called a *concept world*. Realizations connect it to ordinary world episodes, including cases that exhibit a pattern before anyone names it. An insight Event may create a new formulation or grounding version without claiming that it created every possible meaning of the concept. A content-addressed registry preserves the definition versions; the Meaning Model preserves the historical Events and their disputed attribution. The first construction should open only the few concept histories that materially affect its action.

That social history differs from the reasoning by which someone defines or interprets a concept. The latter is a Concept-scoped projection of the Understanding Graph beneath a named understanding-process root and its clock. It

gathers nodes addressing the Concept identifier, exact grounding versions or *define* Realizations, evidence, rejected alternatives, and reasons for retaining or superseding a grounding. An author's definitional history normally unfolds in construction time; incompatible reasoning histories may coexist without becoming accepted world state.

Preserving that reasoning requires a rationale UnderstandingNode for each substantive initial freeze and committed revision, addressing the predecessor and successor, evidence, and material rejected alternatives. Without this lineage the Concept remains valid but its rationale is not preserved. Simple label registration and mechanical metadata changes need no ceremonial nodes.

3.4 Optional deep grounding: love and the Engine

Consider one canonical referent–event model under the polysemous word family *love*: devotional love of a work. Its roles align an experiencer with Babbage and an object with the Engine. This is an optional deep reading of a counterfactual story world, not the universal definition of love and not a claim about a historical person's mind.

Suppose a definition Event beneath one named understanding process carries a Cut that gives components j weights α_j and remainder $\alpha_\perp$. For each component, a separate assessment Event beneath that process and about the target–component alignment carries a local match Cut with shares m_j, n_j, and u_j for *matches*, *does not match*, and unresolved remainder. A recorded alignment a may then derive an aggregate fit Cut on the overall assessment Event transparently:

$$r_C = \sum_j \alpha_j m_j, \qquad n_C = \sum_j \alpha_j n_j, \qquad u_C = \alpha_\perp + \sum_j \alpha_j u_j, \qquad r_C + n_C + u_C = 1, \tag{5}$$

where $m_j + n_j + u_j = 1$ in every component Cut. This is one possible comparator for one grounding strategy, not a universal law of concepts. Its numbers are all sibling-relative Cut shares; the Realization link itself remains unweighted. In the displayed arithmetic below, the four named component Cuts each set $u_j = 0$; the aggregate .100 remainder comes entirely from the canonical model's unspecified component mass.

Canonical component	α_j	m_j	matches	does not match
Care	.35	.90	.315	.035
Attachment	.25	1.00	.250	.000
Desire	.15	.60	.090	.060
Sacrifice	.15	.30	.045	.105
Unspecified remainder	.10	—	—	—
Aggregate fit Cut			.700	.200
Aggregate remainder				.100

Table 4: One inspectable fit Cut against an optional canonical love model.

The useful result is not only the $.700/.200/.100$ aggregate Cut. It is the recorded claim of strong fit on care and attachment, weaker fit on sacrifice, and an alignment that treats a machine as the object role. Another perspective may reject the alignment, select a different love model, use exemplars instead, or decline to score the concept without changing the target world.

Evaluative terms use the same plural grounding mechanism. A decision episode may realize the model of situated intelligence or kindness reached through one understanding process, and an assessment Event beneath that process may carry a fit Cut whose evidence and grounding version remain inspectable. Later outcomes are separate Events, so an organized failure need not be reclassified as an unintelligent action merely because it failed. A coarse statement about a whole person remains perspective-scoped testimony or a declared aggregation over episodes, never an intrinsic trait scalar. Constructing and revising these concept models uses the Meaning Model; learning them and testing their empirical validity and transfer belong to Life Simulation. The grounding may also declare thresholds or vetoes rather than assuming that all components compensate linearly.

3.5 Fit cuts and concurrent concepts

One Event can be linked to both quarrel and farewell. If graded judgments are useful, one assessment Event beneath the relevant perspective root for each Concept link carries its own local fit Cut rather than making the Concepts siblings: quarrel might have matches .80, does not match .15, and remainder .05, while farewell has its own three shares. The

two match weights need not sum with each other because they belong to different Cuts; within each Cut the three siblings do sum to one.

Fit and confidence ask different questions. A fragment may strongly exhibit a concept while the evidence that the fragment occurred is weak; a well-attested fragment may clearly fail to exhibit it. The fit Cut divides the declared comparison unit into matched, unmatched, and unresolved portions. If numerical confidence is needed, a separate epistemic assessment Event asks how support divides among the claim, its rejection, and unresolved alternatives, with its own anchors and evidence. It is not obtained as one minus non-fit, and the fit remainder is not a universal uncertainty score. A construction may instead leave confidence unquantified and mark the fit provisional or unscored. Confidence weights neither multiply nor replace fit weights; a well-supported mismatch remains different from a poorly supported match.

An emotion facet Cut supplies composition, not an absolute intensity scale. If a construction needs a graded activation claim, it must create another assessment Event beneath the relevant inner or understanding process with a Cut over mutually exclusive answers such as materially active, inactive, and remainder, or leave intensity unquantified and describe the episode through its Events. Compatible fit or facet Cuts may be mixed across disjoint temporal children only under a stated question and aggregation. Whether an Event occurred in a decade is instead derived from the Event record; it is not the maximum of an independent degree.

3.6 One World, Many Cuts

The same accepted event can participate in several decompositions without being copied. Consider Earth as a Thing and its modeled history as the bound lifecycle Event over a geological horizon. Thing-side views may open Earth into regions, the biosphere into ecosystems and organisms, or a person into body systems. Event views may link overlapping geological, climatic, evolutionary, and cultural processes, while a sequential Cut may partition the same history into disjoint eras and transitions. One evening of reading can be reached through at least two routes:

$$\text{Earth history} \to \text{evolution} \to \text{human life} \to \text{one evening} \to \text{reading},$$
$$\text{Earth history} \to \text{human culture} \to \text{literature} \to \text{book production and circulation} \to \text{reader encounter}.$$

The routes are not rival world copies. The reading Event binds the same reader, book, and place Things while each cut answers a different question. Retinal activity, emotional appraisal, cultural transmission, and narrative meaning justify different active frontiers. Shared identifiers preserve that the frontiers concern one accepted event.

An avalanche shows why direction cannot be a synonym for intention. A snowpack, slope, terrain regions, and material layers are Things; the avalanche is an Event bound to them. Physical-part events may expose slabs, layers, cells, or particles. A sequential Cut may expose accumulation, instability, trigger, fracture, release, runout, and deposition only at a lens where those phases are ordered and disjoint. Loading, cohesion, friction, temperature, velocity, terrain interaction, and entrainment are linked processes or externally grounded physical data unless a separate question declares a unit over mutually exclusive answers. At low resolution an aggregate stability state and runout envelope may suffice. At a finer resolution, local processes bind exposed material Things. Its direction is physical: forces, constraints, and present state shape possible continuations. Intentional language may be a useful metaphor, but the event ancestry and direction type must not convert it into a claim about a mind.

3.7 Direction from Tendency to Want

For agent modeling, motivation can specialize direction without requiring an unrelated primitive:

$$\text{physical tendency} \longrightarrow \text{biological regulation} \longrightarrow \text{represented want}. \tag{6}$$

The arrow marks increasing representational commitments, not a claim that every process secretly has a mind. A physical tendency follows forces and constraints. Regulation detects or counteracts departure from a viability region. A represented want exists when an actor represents or values a possible state and that representation can alter action selection. Saying that an avalanche "wants" to descend may compress an explanation; it remains an instrumental description unless an internal representation is supported.

In this grammar, a want can be represented as an inner Event contained beneath the relevant actor's lifecycle and inner-process root during a stretch of that lifecycle. A construction may link it to a desired condition of a registered Thing, Event, process, categorical state, or measured world datum. It may then open the want into formation, activation, pursuit, satisfaction, frustration, abandonment, or transformation. A plan is a proposed continuation, and a decision commits one continuation under the actor's represented beliefs, constraints, and competing wants. These are profile

choices with precedents in BDI and goal-systems research [4, 5]; the grammar preserves containment ancestry, interval, question, and evidence without imposing one universal person decomposition or one utility scalar.

4 World, Understanding, and Story

A complete addressed construction has three linked surfaces. The world surface uses the six record forms. The understanding surface uses text-bearing UnderstandingNodes from the Understanding Graph [6]. The document surface uses DocumentNodes. They occupy one identifier space so that a question, reason, or sentence can address the exact world record it concerns, but they retain different semantics, clocks, and authority.

```
UnderstandingNode { id, type, text, created at, typed parents,
    typed links, provenance }
DocumentNode { id, role, text, discourse position, typed parents,
    typed links, optional narrator and viewpoint metadata, provenance }
```

These are surface records rather than seventh and eighth world forms. Every UnderstandingNode has a typed containment path to a named understanding-process root. Every DocumentNode has one to a named document root; `story_passage` is one DocumentNode role rather than a separate record form. An UnderstandingNode externalizes a question, interpretation, reason, criticism, or revision and need not have an Event interval or simplex. A DocumentNode may record an act of telling in discourse order; document *contains* and *next* links do not inherit Event-containment semantics.

Understanding links include `about`, `supports`, `contradicts`, `refines`, `answers`, `learned-from`, and `supersedes`. A DocumentNode links to Events through `renders` and to an UnderstandingNode through `shaped-by`. These links retain their surface-specific roles, not authority over their targets.

World authority is likewise topological. Every accepted world Event has a typed containment path to History. A belief, appraisal, want, or estimate that is itself part of the accepted world sits in a named inner Event process beneath the relevant person's lifecycle. Its `about` links identify what is believed or estimated without promoting that target claim to accepted world state. A joint Event instead represents its participants through Bindings; it does not acquire one participant's perspective merely by binding that participant.

An imagined, remembered, or counterfactual scene has a named model-context Event with a declared modality and source links. Accepting that Ada imagined a successful trial accepts the imagining act, not the trial. The content's depicted interval need not lie within the interval during which she imagined it: context parenthood is distinct from temporal occurrence. A remembered scene and an accepted historical account may address the same Things while disagreeing about what happened. Promoting content into accepted world state requires an explicit accepted assertion, not a traversal through its source.

An Event may carry an optional textual description. That field describes the Event within its own record and ancestry; it is neither an UnderstandingNode nor a DocumentNode. If a description must participate in a reasoning history or in document order, a separate node is created under the applicable root and linked to the Event. Text about an Event is not thereby that Event.

Optional narrator and viewpoint metadata refine a document role without replacing its root path. Conflicting accounts can coexist across these surfaces; agreement or common ground requires a declared derivation and is not silently promoted to truth.

The density of the understanding surface is optional and explicit. A construction may preserve no UnderstandingNodes, only rationales for consequential commitments and revisions, or a finely segmented chronological reasoning trace. Absence means "not externalized at this resolution," not "no thought occurred." A dense trace provides more supervision and auditability, but is not required for a valid world. A claimed rationale trace declares which commitments require nodes and which links connect their explanations. Conversely, an UnderstandingNode never gains world authority merely because it is detailed. When its physical carrier matters, a stored note or document is a representational-token Thing and its creation, reading, transport, and revision are ordinary Events; its textual content remains on the appropriate understanding or document surface.

The Concept-scoped projection described above uses this same understanding surface. UnderstandingNodes carry reasons; Cuts carry numerical commitments. A non-obvious Cut may link to its rationale node, which addresses the exact Cut component or Event it explains.

4.1 Operative models and estimates

For an actor a, inner records active at t and accepted records disclosed to the actor by t form the actor projection $\mathcal{M}_a(t)$. Its inner records descend through a's lifecycle and inner-process root; shared Thing identities preserve reference, while hypothetical targets remain within that context. The subset that organizes conduct at a decision is the actor's operative model $\mathcal{M}^*_a(t)$. Generation of speech or action from that model is restricted to content actually recorded as observed, communications received by the cutoff, and earlier records on the same admissible paths. Co-presence permits an observation; it does not reveal every field of an Event or another participant's private state. Observation and delivery records therefore identify the content disclosed. Permission-aware ancestry traversal cannot be used to bypass that boundary. A contradiction with accepted History is therefore representable as misperception rather than being silently repaired with author knowledge.

An observer's account of the actor is different. It is an estimate Event beneath the observer's inner-process root, linked `about` the target record, and supported only by evidence accessible along that observer's paths. Self-report, another character's estimate, an author's construction-time interpretation, and the actor's operative state may all disagree. Compatible Cut estimates can be compared by total variation and categorical claims by equality; those divergences are derived diagnostics, not new semantic numbers. The profile also bounds higher-order nesting—what one character thinks another thinks—rather than granting unbounded omniscience. Life Simulation may later evaluate or learn such estimates; their ancestry and access semantics belong to the Meaning Model. A categorical or measured estimate retains the target's data type and units; an estimate of semantic composition uses a compatible Cut on the estimate Event. Missing records or unequal coverage indicate ignorance or noncoverage, not automatically disagreement or error.

4.2 Transactional construction, rendering, and read-back

Progressive construction uses the same commit discipline for world records, UnderstandingNodes, and DocumentNodes. The accepted parent is frozen. A proposal is a whole candidate delta containing every new or superseding record required across the three surfaces. Validators inspect it against the frozen parent, including every new typed root path. Rejection leaves the active graph unchanged, although a construction log may retain the candidate and its explanation. Acceptance commits the candidate atomically. A later change is a new candidate with explicit `supersedes` links and revalidation of the affected dependency closure. This is a construction rule, not a claim that the generator is infallible.

The commit envelope names the base snapshot and branch, candidate records and links, replacement map, exact revisions read, applicable validators and tolerances, and any refinement witness with its protected queries. This is transaction metadata, not another world form. Each branch has one active revision per logical identity. A stale base or changed read dependency rejects the candidate; rebasing requires renewed validation. Matching identifiers do not merge branches. Commit appends one immutable cross-surface snapshot and advances its head atomically.

Revision preserves predecessor records and revalidates affected dependents. Operators, including opaque ones, must declare the records they read; source-bound views and passages also record derivation dependencies. Those declared links determine which dependents must be rechecked, regenerated, or marked stale. A generic `about` link alone does not define such a dependency. These are the required semantics; the current Rust host does not implement every cross-surface step.

Consider a trial assessed as successful under a particular grounding bundle. Its Event, Realization, assessment Cut, supporting UnderstandingNode, and rendered DocumentNode address exact revisions. If finer phases expose a failure excluded by that success criterion, the opening must be rejected or explicitly revise the affected commitments, with declared dependents rechecked or marked stale. Earlier accounts remain addressable. This connects the outcome, its meaning, the rationale, and the text through one revision history; storing them together alone would not establish their agreement. The selected checks and semantic judgment still do that work.

A direction Cut can make the generator's freedom inspectable. Its children are mutually exclusive candidate continuations and its remainder retains options not articulated. A draw that selects the remainder requires a new admissible proposal; it must not silently discard that mass and renormalize the named answers. The constructor may fix mass needed by the premise or an earlier commitment, draw among the remaining alternatives with a recorded seed, and then build the selected continuation as a complete candidate. A poor draw may be rejected under preregistered gates, but it is not silently rerolled until the author likes the answer. Rejected siblings and reasons remain addressable. Thus the model can materially decide the story while authorship remains bounded by declared constraints and visible intervention.

A rendering route records the source commit and epistemic status; an ordered route through Events and its currently opened frontier; optional narrator and viewpoint metadata; the evidence accessible at that story-time cutoff; a disclosure policy; and the target DocumentNode with role `story_passage`. It prevents a renderer from importing later facts,

private state beneath another character's inner-process root, or an undelivered document. The route is a construction profile over existing references, not a seventh world relation.

Read-back applies the inverse operation in a fresh context: infer the Things, Events, Cuts, Realizations, typed ancestry, and links implied by a story-passage DocumentNode, then compare that proposal with the source commit. A mismatch can expose an omitted record, an unsupported sentence, a wrong root path, or prose that implies a different composition. Its resolution is another explicit candidate: revise the DocumentNode, revise the model with justification, or retain a declared ambiguity. A read-back UnderstandingNode under the named review process preserves the disagreement and decision. This closes the loop from model to prose and back without treating prose as the sole authoritative copy.

Event segmentation and situation models help explain why readers can follow such routes and detect discontinuities [7, 8]. The representation nevertheless keeps a modeled interior, an author's reason, and a reader's later interpretation as related claims beneath different typed roots.

4.3 The unfunded successor, 1852–54

Chapter X of the completed *Book of Conditions*, *The Unfunded Successor*, supplies an actual construction example. At Ockham in August 1852, Lovelace recognizes that both her claim authority and Neale's independent checking depend on single people. She asks for funded training and outside supervision of a second checker. Babbage brings a mechanical self-comparison design, then recommends waiting; Halden defers the expenditure. Lovelace dies with the request unanswered. In 1854 Halden authorizes delivery without the independent check, and Guardian returns the erroneous table. These are the finished Book's authored events and character interpretations, not evidence about the historical minds of Babbage or Lovelace.

The construction's world descriptions identify the succession decision as E20, Lovelace's death as E21, the omitted check as E24, and the returned table as E25. Understanding note U05 explains why her death removes active pressure but neither inserts the wrong number nor forces Halden's decision. Chapter X renders the earlier succession episode; Chapter I opens with the later failure. Figure 1 maps these existing materials onto the three surfaces: character interpretations belong beneath their inner-process roots, U05 supplies the construction-time rationale, and the chapters supply DocumentNode text with role `story_passage`. The notes and chapters were subsequently imported as native surface records (Section 6). That retrospective receipt does not recover the original cross-surface authoring transactions.

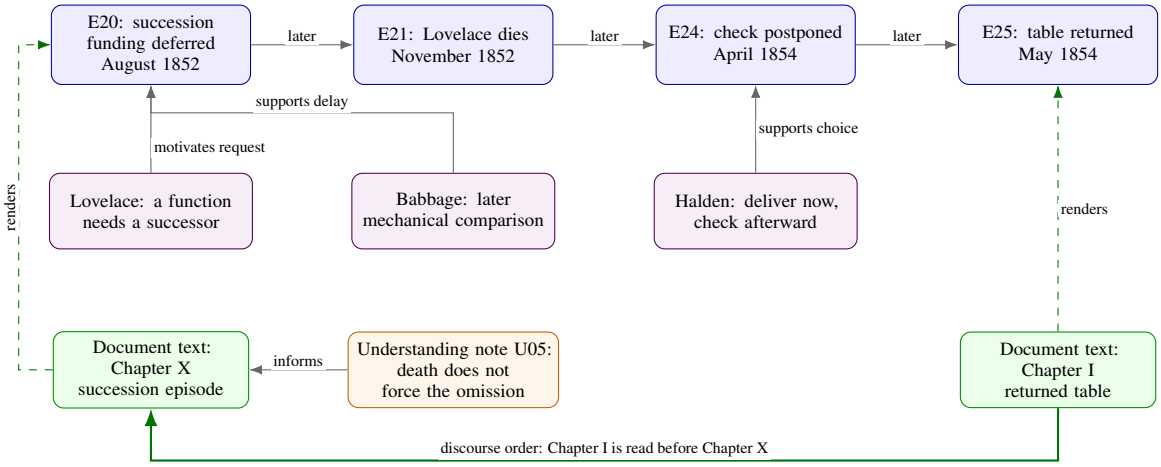

Figure 1: Selected records from the completed Book, mapped to world, understanding, and document surfaces. The top arrows show story order, not causal necessity. U05 belongs to construction time; the bottom arrow shows the different order in which the reader encounters the events. Character interpretations and the author's explanation remain distinct. Edge labels are explanatory glosses, not literal Understanding Graph edge-type names.

5 Closure and Sufficiency

Closure is claimed only relative to a declared purpose and resolution. We first ask whether the same records can be refined recursively without erasing accepted commitments, then turn that capacity into a finite-resolution sufficiency test.

5.1 Recursive refinement at a declared resolution

Suppose a finite-resolution world contains the physical records above. Opening a thing adds things and events that preserve the parent's identity boundary. Opening an Event may admit qualified child answers under a declared Cut, expose concurrent Event-processes, add linked episodes and updating Events, or expose typed world data. Only a Cut invokes a one-unit composition contract; a sequential Cut additionally requires disjoint intervals and derived duration shares. Describing a target adds a realization record using one declared concept grounding. If that grounding is a canonical model, its role-bearing things and events reuse the same world grammar. In this restricted sense, physical refinement is recursively closed.

The grammar places no intrinsic lower or upper bound on modeled resolution. A cell, person, institution, planet, or galaxy uses the same Thing–lifecycle pairing when its identity and persistence matter; organelles, group members, or stars can be exposed through time-scoped relations; and biochemical changes, decisions, discoveries, mergers, or explosions are Events at the resolution in which they matter. Containment and temporal refinement provide hierarchical views, while overlapping processes and cross-resolution update links keep the full representation a graph rather than one tree. Domain content remains specific: a cell may require biochemistry and a galaxy astrophysics, and neither acquires an inner-process ancestry merely by sharing the grammar. Increasing model capability may open unresolved remainder, propose and test better boundaries, processes, measured world data, and candidate domain laws, and check compatibility across resolutions. It need not merely add detail; a better abstraction may justify an explicit revision that supersedes many weak records with a smaller, more predictive account. This is a claim of representational extensibility, not that the present model knows every resolution or that every process follows jump diffusion.

Psychological resolution follows the same rule. A person profile selects questions for a construction, not the expressive limits of the grammar. There is no prescribed maximum depth or universal personality tree. A coarse account of an authored character's resistance to delegation might be opened into concerns about accuracy and recognition, beliefs about a colleague's competence, and memories of broken promises. Further detail could distinguish private collaboration from public assessment, or trace how later experiences alter that difference. These remain interpretations in the relevant actor or observer context, not psychological facts established by adding detail.

A more capable model could choose different questions, boundaries, and depths according to what a scene or inquiry needs to explain. Competing motives may form a Cut under a declared attention question; beliefs, memories, and relationship Events remain linked processes without being normalized together. An opening under the same question must preserve its declared coarse commitments. A different question creates another view, while a changed account requires explicit revision. Thus psychological refinement can elaborate, reorganize, or simplify a person's model rather than merely populate a fixed template. Meaning Model supplies this representational freedom and its preservation contracts; Life Simulation considers how to learn which refinements are useful.

A connected Meaning Model of actual world history and geography can deepen as evidence arrives. Sources share supported identities while retaining separate claims, evidence, and disagreements. Regions and centuries can open into institutions and lives without equal detail everywhere. New evidence can revise earlier accounts, not merely add detail. Corrections preserve distinct event and revision times. Acceptance does not establish historical truth; fictional worlds retain separate contexts. Meaning Model supplies the representation and revision contract; Life Simulation develops corpus-wide construction, interpretation, and training.

This is not a theorem that every true explanation is a weighted tree. Cuts may cross; events can be both causes and consequences under different questions; and domains can attach specialized measured data, laws, fields, or solvers. Those attachments are content referenced by events. Nor does the claim imply that cognitive testimony or prose must be encoded as cuts. The Understanding Graph and document surface remain interoperating representations with different jobs.

5.2 Finite-resolution sufficiency as a test

A representation is sufficient only relative to a query, tolerance, and cost. For a story-coherence query, the identity of the Engine, the intervals of key events, who held each belief, and how fine emotions recompose may be sufficient. For stress analysis of a gear, the same representation must point to geometric and physical state that this paper does not attempt to replace.

The bounded constructive argument is deliberately modest. Any finitely specified simulator with computable or approximable transitions over a bounded horizon can be wrapped in one root Thing and its lifecycle/root Event: place the simulator configuration in event state, reference its transition semantics as direction, and expose its outputs through typed observations. If nothing more is known, leave the root opaque. Later useful identities and processes can be opened through Things, joint Events, and cuts while the root behavior remains a consistency check. Bare representational

universality is therefore cheap. The substantial hypothesis is that useful stable identities and cuts exist and improve compression, prediction, explanation, control, or coherent generation enough to justify their cost.

The sufficiency claim can fail in three ways. A required distinction may fit no record profile. A composition rule may destroy information needed at a coarser level. Or the cost of explicit articulation may exceed its value. Such failures should produce a remainder when a governing Cut exists, leave other detail implicit or add a domain attachment, or reject the grammar for that task–not a declaration that the world has been fully represented.

Cross-cut identity is the main defense against false trees. Einstein can be important in a scientific cut and nearly absent in another person's daily-life cut without being duplicated. A relationship can participate in emotional, economic, and legal cuts. Local weights answer local questions; the shared thing and event identifiers preserve that these descriptions concern the same world.

Five questions provide the evaluation contract:

1. **Coverage:** Can the target be represented without changing the concept, Thing, Event, Binding, Cut, and Realization grammar?

2. **Reference:** Do descriptions and roles resolve to the intended continuing Things across time and opened detail, while explicit split, merge, replacement, and succession events change identity when required?

3. **Grounding:** Do concept links and optional canonical models recognize held-out instances, reject counterexamples, and remain calibrated in ambiguous cases?

4. **Recomposition:** Do admitted children recover their parent's declared Cut commitments within the frozen tolerance, and do Event-process links, role bindings, identities, and typed world data satisfy their own contracts without being treated as Cut weights?

5. **Value:** Does refinement improve prediction, explanation, control, or coherent generation enough to justify construction, validation, inference, and maintenance cost?

6 *The Book of Conditions*: Completed Book, Partial Witness

The Book of Conditions is a completed twelve-chapter manuscript with an authored world, selected concept grounding, rooted UnderstandingNodes, and an ordered story route. It is a partial witness of the grammar's construction contracts, not a completed implementation of them. It was built anew from a released historical prefix and an explicit counterfactual divergence. No discarded earlier Book supplies evidence, accepted records, counts, or prose to the construction reported here. The result tests whether the grammar can hold one inspectable long story at a declared resolution; it does not demonstrate every permitted profile or establish comparative advantage.

6.1 A Book-specific profile

The construction began with the Universe Thing and History Event, then registered only the people, institutions, places, documents, machine parts, and collective processes needed at coarse resolution. Lifecycles, relation Events, presence, and typed historical data established the prefix. Character interiors are Events beneath the relevant person's lifecycle and inner-process root, never retrospective facts about historical minds. Private actor projections are limited by presence, communication, delivered evidence, and their typed ancestry so that a decision can be generated from what the character could know at its cutoff.

For principals, the Book uses the compact profile in Table 5. It is one replaceable construction choice, not a claim that every person or story requires these questions or children.

View	First-construction reading
IS	Nine concurrent, unweighted life processes: body, kin, partnership, work, place, means, knowledge, standing, and meaning. They may overlap and do not sum.
WHAT	Event-parented scene Cuts open concern, then the conditional approach/threat-avoidance unit, then AtomicWant leaves. A distinct chain links an avoidance want to a threat-belief Event, fear appraisal, and action.
HOW	Event-parented scene Cuts divide problem-solving attention among framing, deciding, and remainder, with conditional concrete/abstract and impartial/personal views. Strategies remain linked records unless another unit justifies a Cut.
FEELS	A scene appraisal Event parents the emotion Cut. It is compared with supported wants, beliefs, and Events rather than treated as a consequence of the concern weights alone.

Table 5: The replaceable IS/WHAT/HOW/FEELS profile selected for the Book.

The Book's scene and coarse period profiles are authored. A finer temporal opening must recompose its parent by duration and report coverage; the selected scenes do not yet supply that complete partition. Conditional profiles reuse records under named situations and participant sets. The selected concerns, strategies, emotions, temporal resolutions, and person leaves are first-construction vocabulary, not universal human structure. Every nested Cut remains on a scene Event beneath the applicable inner process, names its conditional unit, and retains a tested remainder.

The Book's derived shock profile applies Section 2.2.4: it names the affected processes, available prior expectations, response Events, and descriptive adaptation shape. Table 6 locates the pattern in actual accepted records, from the historical setting to opened trial phases. Success itself is consequential: shared pleasure at E14 and subsequent inquiries at E16 reinforce the confidence behind E18's overexpansion. Adaptation is therefore not always prudent adjustment.

Resolution	Antecedent and perturbation	Recorded response
Historical setting, 1847–48	Staged finance supports manufacture; wider credit contraction delays a subscription call (E11).	Existing wages are paid, new work slows, and the undertaking does not enlarge its scope to attract money. A coarse historical process constrains workshop activity.
Institution and lives, 1852–71	Lovelace identifies the succession risk (E20); her death ends her active role (E21). The later returned table exposes the checking failure (E25).	Disclosure and correction (E26) precede office closure (E27). Babbage's interpretation changes over years (E28), ending in custody of the complete record, including failure (E29).
Project episode, July–November 1846	Individually conforming assemblies bind under a shared drive (E09).	Interface rework (E10) restores operation at a cost in time and money while preserving the contracted apparatus, rather than authorizing every proposed redesign.
Trial and its phases, May 1851	A frozen test packet (E13) precedes the clearing failure and stopped run (E14a).	The run is restarted; complete agreement supports the bounded claim (E14b), followed by shared pleasure (E14c). The prose opens the waiting and recognition further, card by card.

Table 6: Cross-scale anticipation, perturbation, and response in the authored Book. The rows are linked readings, not exclusive Cut children. The opened trial phases have no exact minute durations or within-scene numerical curve.

These cases support representational coverage, not a universal cycle theory. In particular, U05 separates the anticipated succession failure from the transcription and delivery choices: Lovelace's death neither enters the wrong number nor compels omission of the check. The longer arc is explained through those intervening Events, not by treating one loss as sufficient cause.

The construction used a frozen flat Concept registry: identifiers, one-line descriptions, obvious typed relations, and exemplar anchors only where a judgment required them. Thirty-four bundles received content-addressed grounding versions. Prototypes and canonical models were excluded from the flat registry; after the world was accepted, one small model of a valid computational claim was opened as an unscored integration example. The love–Engine model in Table 4 shows the intended arithmetic without prejudging the Book's choice. Three concept histories at most were permitted where invention or revision materially affected the story; all other histories remained unopened.

The selected run used exact integer-tick normalization, a .10 elicitation grid with supported .05 refinement, no continuous extents, an estimate-depth cap of two, and full scene profiles only for the three principals. These are construction choices, not additional grammar obligations.

6.2 How the construction proceeded

The Book construction proceeded in six rounds.

1. Preparation fixed the historical cutoff, premise, vocabularies, access rules, and budget. Preparation prose remained external, not runtime authority.
2. The constructor registered roots, historical prefix, Things, lifecycles, relationship and presence Events, and thirty-four Concept bundles, retaining unresolved documentary detail.
3. Five isolated whole-history candidates were generated under a common schema. All were rejected: negotiation lacked a credible route to priced, accountable construction. None was admitted to History by a Direction roll.
4. A pragmatic successor was then written first as one paragraph and expanded successively to two, three, four, and five paragraphs. Opening the account exposed the missing commercial founder. Local defects prompted repairs, not restarts unless the parent history failed.
5. Thirteen complete lives were placed at coarse resolution before three principals were opened into concurrent processes, local Cuts, and linked UnderstandingNodes. Events, relationships, ledgers, and one concept model elaborated or explicitly revised the macro account.
6. Twelve route units were selected and rendered. Later literary passes report updating Event and life descriptions before corresponding prose; changes without new world facts remained rendering decisions.

Saved checkpoints demonstrate coordinated model and prose revision, not every within-round editing order. This is model-assisted authorship, not the fully automated transaction protocol. The final world was not chosen by a preregistered Direction draw; missing execution logs cannot be supplied retrospectively.

6.3 Construction artifact, Rust host, and validation boundary

The public package in `examples/book-of-conditions/` retains the accepted macro accounts, lives, Cuts, descriptions, ledgers, rationales, route, and manuscript; earlier proposals remain development history. The engine is included in `rust-engine/`, with its MCP interface alongside it. A retrospective import records source digests, a persisted Rust compilation response, 117 person-process addresses, 107 authored Cuts plus one derived duration Cut, and linked document and understanding nodes in SQLite. Reloading recovers the model; native document rendering reproduces the manuscript. This is a new import receipt, not a source-locked transaction for the original construction or an independent read-back record.

Sema minted and verified the thirty-four flat definition bundles so that each has a content-addressed grounding version [3]. The Rust host compiled forty structural authoring profiles: thirteen persons, nineteen other Things, three relationships, one Concept, and four change arcs. These loaders create openable scaffolds, not semantic scalars. Psychological numbers remain Cut weights; pounds, hours, dates, and counts remain world data.

Table 7 states the implementation boundary. The development checkpoint-06 synthetic conformance suite passed all 31 positive and negative fixture expectations, seven report checks, and three targeted Rust tests; its original checkpoint is not included in this accepted-artifact release. These are mechanism checks, not evidence that the authored history, character interpretations, or prose are true or good.

Layer	Exercised in the construction	Not established
Rust host	Profile compilation, immutable persistence, Cut normalization, component addresses, nearest-root ancestry, and source-bound document rendering	Complete mixture closure, cutoff-safe context assembly, independent read-back, or recovery of the original authoring transactions
External validator	Cut sums and remainders, selected recomposition fixtures, lifecycles, ancestry, presence, access, person-profile shape, and route exclusions	Historical or psychological validity, cross-surface atomicity of the final pragmatic successor, or independent prose recovery
Authored construction	Macro revision, Event and life descriptions, local Cut judgments, UnderstandingNodes, route selection, and prose	Automatic induction, forecast calibration, or an empirical advantage over unstructured writing

Table 7: What the first construction exercised and what remains outside the implementation claim.

A separate, small reference bundle makes selected contracts executable without claiming that the Rust host already enforces them. The synthetic apparatus trial in `examples/refinement-trial/` uses all six world forms and a ten-minute local clock; it is inspired by the Book's kind of scene, not a historical record or a retroactive validation of the Book. Its frozen parent records configuration A and twelve matching cases. An opening introduces phases of two, five, and three minutes, with the four-child outlook Cuts below. Close maps fatigue and the fine remainder to the coarse remainder.

Phase	Duration share	Hopeful	Cautious	Fatigue	Remainder
Preparation	.20	.80	.10	.06	.04
Execution	.50	.60	.30	.06	.04
Comparison	.30	.40	.50	.06	.04

Table 8: Synthetic refinement: the declared projection and duration mixture recover the parent $(.58, .32, .10)$ for hopeful, cautious, and remainder.

The tests reject a changed coarse answer even when every child still sums to one, overlapping phases, incorrect duration shares, infeasible partial residuals, and stale candidates. An explicit configuration revision preserves its predecessor, changes the active head, and marks its dependent passage stale. A cutoff query exposes the configuration Ada observed, not concealed results on the observation's source Event. The accepted candidate includes a rationale UnderstandingNode and a passage DocumentNode. A fresh-context extraction recovers the stated configuration, case counts, phase durations, and observation time; it does not recover outlook weights absent from the passage. The saved extraction is a single model comparison, not an independent reader study or a general prose parser.

The bundle runs with `node -test examples/refinement-trial/example.test.mjs` and documents its authored inputs, eleven test families, and extraction provenance. It is a bounded reference implementation, not a general graph validator. A stable public archival release identifier remains to be assigned.

6.4 Descriptive numerical portrait

The numerical portrait uses three categories. Cut weights are represented sibling-relative shares under one named question and remainder. Typed world data retain external units. Counts, density, total variation, means, and ranges are derived operational diagnostics rather than additional facts in the world. Table 9 reports the accepted artifact at its declared resolution; duplicate display tables are excluded from the Cut inventory.

Construction quantity	Count
Flat content-addressed Concept bundles	34
Inventoried authored Cut instances	107
Child and remainder weights in those Cuts	472
Primary numbered Events plus explicitly opened child Events	$30 + 7$
Complete human lifecycles at the declared resolution	13 (3 detailed, 10 coarse)
Macro trajectories and named phases	4 trajectories, 13 phases
Rendered chapters and manuscript words	12 chapters, 11,046 words
Distinct Cuts per thousand rendered words	9.69

Table 9: Descriptive footprint of the accepted first construction. Density is a maintenance and representation statistic, not a quality score.

The 107 Cuts divide into 12 scene-WHAT, 13 scene-outlook, 27 scene-HOW, 9 scene-FEELS, 11 slow-outlook, 11 threat-character, 13 health, and 10 world decision or forecast Cuts, plus one canonical component allocation with zero remainder. Among the eight earlier families, mean remainder ranges from .060 to .081; the full observed range is .04 to .20. No global semantic mean is computed, because the questions and divided units differ.

One shared Event demonstrates why perspective Cuts and world data must remain distinct. At the May 1851 trial, assured-fulfilment shares are .76 for Babbage, .70 for Lovelace, and .72 for Halden. In February 1852, the local expansion margin $w(\text{accept four}) - w(\text{limit to two})$ is +.30, -.50, and +.20 respectively. These are not votes: Halden alone holds contracting authority. The world-unit constraint is independent of those interpretations. Four jobs require $4 \times 40 = 160$ checker-hours against 80 protected hours, a twofold demand-to-capacity ratio and an 80-hour deficit.

Nested opening remains local. Early Babbage's threatened-fulfilment share .64 multiplied by autonomy-at-risk .34 gives .2176 of that period's full outlook unit because the second Cut explicitly opens the first; it is not a free fear score.

The six disjoint periods cover 10,289 days exactly, so their sequential shares sum to one by duration while saying nothing about narrative importance. Across the eight listed adjacent slow-outlook transitions, compatible-Cut total variation ranges from .11 to .31; across four selected scene transitions it ranges from .38 to .60. This is a descriptive authored pattern, not a fitted shock law or population result. The complete family, ledger, apparatus, and duration tables remain in the released numerical supplement. None of these diagnostics establishes predictive validity, population psychology, causal identification, or superiority over an unstructured writing process.

Figures 2 and 3 make the long and short views visible without inventing an absolute psychological scale. The first plots compatible period Cuts as categorical intervals. The second plots compatible scene Cuts inside their shared simplex. Neither is a fitted temporal function: the marks display authored commitments at the resolutions actually opened by the construction. For example, Babbage's assured share is .79 at expansion, .28 at the returned table, and .51 at custody. The last point accompanies a changed interpretation of the work, not a return to expansion confidence. These are sibling-relative authored appraisals, not forecast probabilities or a measured recovery curve.

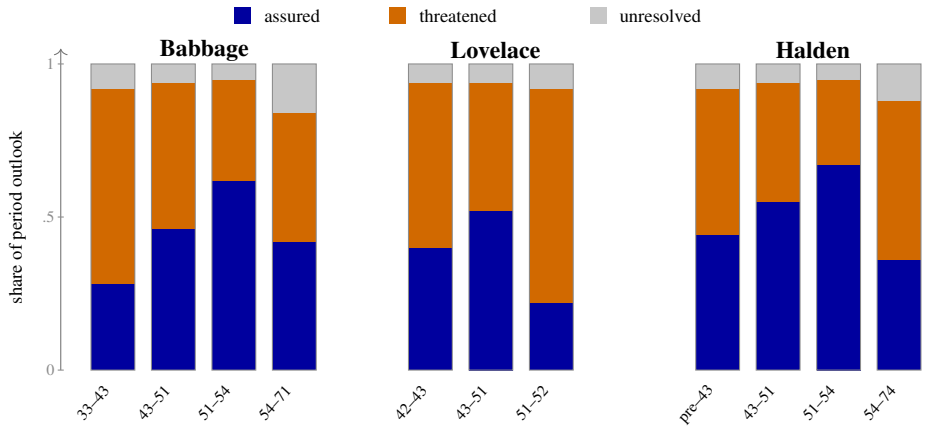

Figure 2: Slow fulfillment-outlook Cuts across the principals' opened periods. Each bar divides one period-specific unit among assured fulfillment, threatened fulfillment, and unresolved remainder. Equal bar widths show authored period order only; they do not encode duration, intensity, probability, or measured psychology.

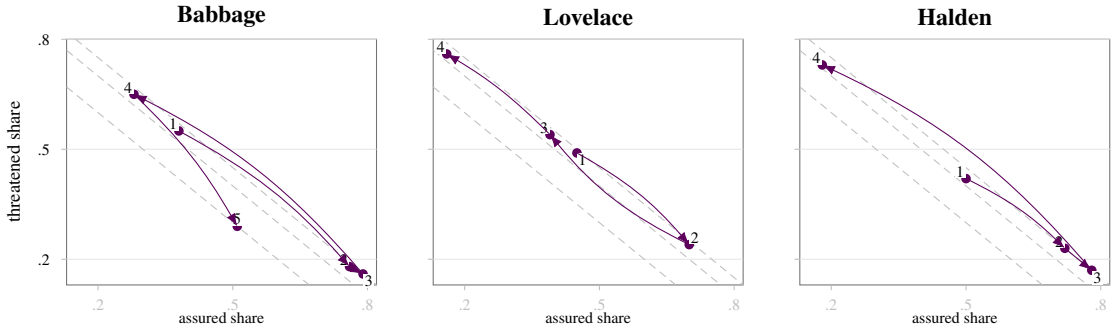

Figure 3: Selected scene-outlook Cuts as chronological paths through a magnified coordinate view of the same three-child simplex. Horizontal and vertical position give assured and threatened share; the three diagonal guides give unresolved shares of .05, .10, and .20. Babbage: negotiation, trial, expansion, returned table, custody; Lovelace: proposal, trial, qualification, succession request; Halden: estimate, trial, expansion, returned table. Curved arrows separate reversals and order the elicited scenes; they do not interpolate a continuous function or make the selected scenes an exhaustive time series.

6.5 Prospective comparative evaluation

The completed Book does not satisfy the still-prospective comparison. A future scored construction must preserve source-locked accepted commits, direction Cuts and seeds where selection is claimed, DocumentNodes linked to those commits, independent read-back proposals, and the final model under one preregistered protocol. Structural

conformance then asks whether that construction completes without undeclared vocabulary changes, silent revision, unresolved references, or violations of its Cut, ancestry, and access contracts.

All scored Cuts use a frozen elicitation procedure. The prompt states the parent Event with its complete typed ancestry, question, unit, admissible siblings, evidence cutoff, and remainder; the model compares the siblings in a fixed order, assigns the local shares once, and supplies an UnderstandingNode for non-obvious choices. Granularity, normalization, and retry rules are fixed before generation. Compatible scene-level Cuts are elicited; slower summaries are derived only through the declared temporal partition. A predictive direction Cut declares its outcome partition and probability interpretation before the outcome; its realized continuation may then receive a preregistered Brier score, with calibration evaluated across forecasts. Proposal weights describe the constructor's sampling rule instead and are not relabeled as forecasts after the outcome.

The literary comparison is preregistered before passages are rendered. At equal information and output budgets, the structured condition is compared with a direct-prompt baseline and a prose-bible condition; a serialization-only ablation may be included to distinguish structure from additional information. Independent auditors count contradictions against the same released facts, while blind readers compare long-range coherence and literary quality. Read-back evaluates whether fresh inference from the prose recovers the committed distinctions, root paths, and Cut compositions within a tolerance fixed before the scored run. Total variation is used only for compatible Cut vectors; identity, ancestry, presence, chronology, and document access use categorical or interval checks. At least one dialogue or shared Event is rendered from two different character cutoffs so that the test can ask whether prose preserves both perspectives rather than averaging them. Book-specific appraisal and strategy checks ask whether an active threat belief has a compatible fear appraisal and whether a chosen strategy is supported by the operative wants, beliefs, and constraints; they test the frozen profile, not universal psychology.

Cut density, remainders, direction calibration, rejection and revision rates, prose length, model calls, tokens, latency, human adjudication time, storage, and maintenance work are reported so that lower contradiction counts cannot be bought simply by saying less or spending an unreported budget. Exact sample sizes, tolerances, rating design, and calibration thresholds remain to be fixed in the preregistration rather than selected after results are seen. The pending freeze also includes the primary contrast, unit of analysis, operational violation definitions, auditor adjudication and agreement statistic, minimum output length, a read-back independence rule that withholds source Cuts, and the procedure used to calibrate tolerances. This paper deliberately supplies none of those values before that preregistration is written.

No outcome is assumed, and negative findings are required rather than folded into a revised success criterion. If a prose bible performs as well, if readers prefer the baselines, if perspective separation or appraisal checks fail, if read-back cannot recover the records, or if explicit maintenance cost overwhelms the gain, the comparison has located a limit of the proposed representation. If the structured condition succeeds, it establishes an incremental advantage beyond the partial descriptive witness at one resolution; it does not establish a universal ontology or a theory of temporal dynamics.

7 Related Work

Prototype and family-resemblance accounts reject the assumption that every category is defined by one set of necessary and sufficient surface features [9]. The Meaning Model likewise permits graded fit Cuts, exemplars, boundary cases, and plural models. Only its deepest grounding option requires an inspectable canonical world fragment.

Structure-mapping theory treats comparison as an alignment between relational systems [10]. Realization borrows that discipline: role alignment is recorded before component fit is aggregated. The present proposal is narrower computationally; it does not claim a complete cognitive theory of analogy.

Frame semantics and script accounts organize meaning around structured roles and characteristic situations or event sequences [11, 12]. Canonical Meaning Models can make those roles and sequences refinable through the same thing-event grammar used for a token world. Conceptual spaces instead emphasize geometric regions and similarity [13]; such a space can be attached as an external domain model, while Realization links and fit Cuts preserve the grounding, alignment, perspective path, and local alternatives used.

Process ontology and event mereology motivate taking temporal entities and their parts seriously [14, 15]. The continuant–occurrent and SNAP–SPAN tradition likewise distinguishes entities that remain identifiable through change from processes extended in time, and explicitly relates a continuant to the occurrent that is its life [16]. The Meaning Model's Thing–lifecycle pairing is in that lineage, while its local cuts and plural concept grounding address a different construction problem. Object-Process Analysis places objects and processes in one recursively scalable systems account [17]. Descriptions and Situations distinguishes a reusable description from a situation satisfying it [18]. The Meaning

Model's distinctive choice is the local one-unit cut with explicit remainder, ancestry-derived perspective, plural concept grounding, and conservation under progressive refinement.

Narrative systems already maintain worlds. Inform tracks rooms, objects, containers, and interaction scope [19]; bAbI tests synthetic location and relation updates [20]; ProPara annotates entity existence and location changes [21]. EvolvingWorld couples persistent character and global state in literary role-play [22]. Narrative World Model extracts typed temporal memory from accepted prose and invalidates downstream records after edits; its reported evaluation concerns narrative question-answering, with generation evaluation left for future work [23].

Hierarchical and model-assisted authorship also have direct precedents. DOC expands hierarchical outlines and controls passages against them [24]. DOME interleaves detailed planning and writing with temporal knowledge-graph memory [25]. Generative Agents combines recorded experiences, reflections, and plans to produce behavior [26]. The Meaning Model therefore does not claim to introduce planning, graph-backed storytelling, or reflective characters. Its candidate distinction is the preservation contract joining them: a coarse world remains consequential before its details exist; an opening must satisfy declared fine-to-coarse checks or trigger explicit revision. Local comparative person Cuts and versioned concept groundings participate in that same construction rather than forming unrelated annotations.

The cross-scale pattern has important precedents. Holling's panarchy account links faster, smaller adaptive cycles with slower, larger ones: local disturbances may propagate upward, while accumulated structures and resources shape reorganization below. He also describes departures from the cycle [27]. This is a close conceptual relative, not evidence that every represented process must complete the same stages.

Dalio offers a historical practitioner comparison. He recounts revising his expectations after the market response to the 1971 gold-policy change, using earlier history to understand the surprise. His larger account combines debt, internal conflict, geopolitical change, natural disturbances, and human adaptation and invention [28]. The relevant connection is historical pattern, expectation, surprise, and revision; neither his causal interpretation nor a fixed historical cycle is adopted as a law of the grammar.

At everyday timescales, event-segmentation theory connects perceived boundaries with prediction error and considers simultaneous finer and coarser event models [7]. These accounts supply related hypotheses at different scales, not a single established mechanism from perception to history. The Meaning Model makes their processes, expectations, responses, and cross-scale explanations addressable for comparison. Change-point, jump–diffusion, mean-reverting, self-exciting, and hybrid models are downstream candidates for Life Simulation rather than alternative record grammars [29, 30, 31, 32, 33].

Semantic Spacetime treats promises, agents, names, and scale as foundational to functional knowledge representation [34, 35, 36]. The present grammar is compatible with multi-scale semantic graphs but uses explicit model commits and question-local composition rather than assigning one global significance to a node.

The contribution is architectural and methodological: coordinated refinement and revision of world commitments, concept interpretations, authoring reasons, and prose. A revised success criterion, for example, can require rechecking a trial's assessment, the rationale for expansion, and the passages expressing both. The relevant comparison unit is that complete operation: what may remain unconstructed, which commitments an opening protects, and how a revision affects the connected account. An antecedent for graphs, normalized allocations, or revision alone does not settle whether this method has already been specified; neither does their combination establish priority by itself. A comparison should ask which contracts a predecessor supplies and which additional coordination this proposal requires. The Book partially demonstrates feasibility, while comparative literary benefit, learning gains, and computational savings remain untested.

8 Limitations and Research Boundary

Normalization enforces accounting consistency, not truth. A cut can ask the wrong question, choose misleading children, or encode an LLM's bias with false precision. A concept hierarchy, exemplar set, or canonical model can privilege one culture or perspective. Role alignment can manufacture apparent similarity. The recorded ancestry, remainder, evidence, provenance, and grounding version make these judgments inspectable rather than eliminating their biases.

The anchor vocabularies are not yet validated. Definitions can drift, pairwise ordering can be inconsistent, and sparse exemplars can conceal important boundary cases. Concept induction can overfit examples or mint names until comparison becomes meaningless.

The mixture law applies only where compatible Cut questions warrant it. Occurrence, logical constraint, topology, and causal intervention remain Event or domain relations; an intensity claim requires its own explicit Cut or stays

unquantified. The grammar does not replace physics, economics, biology, geometry, or any field with units and specialized laws.

Book-specific person, emotion, motivation, and strategy vocabularies have not been validated as complete, culturally portable, or optimally independent. They are replaceable profile choices. Event and period boundaries are likewise model commitments rather than naturally labeled facts. The grammar makes these choices inspectable; it does not turn them into a psychology or a dynamical law.

Root and surface separation preserve attributions but do not reveal hidden minds. Historical character interiors remain authored interpretations. Human explanations inherit hindsight, narrative compression, and over-attribution to character. A model trained on them may become better at predicting people or merely better at producing plausible stories about them.

Finally, recursive refinement is not empirical utility. A strong language model may already maintain equivalent structure implicitly. The Book comparison must establish whether explicit records improve coherence and read-back enough to justify their construction and maintenance cost.

8.1 Bridge to Life Simulation

Life Simulation uses completed or ongoing worlds to study the generation, inference, and learning of process histories. Continuations may come from an LLM, an authored account, a simulator, or a fitted function; no compact dynamical law is required. Comparing continuous, discrete, or hybrid laws is one research task within that broader method. Its process-aware models are intended for games, scientific or social simulation, Ontology of the Alien, Fractal Intelligence, and alignment-facing curricula [1].

This is not a one-way handoff. Life Simulation can propose a continuation or a predictor; Meaning Model construction rules still govern its representation, acceptance, and effects on dependent records and text. Meaning Model read-back checks what a passage says about its source world. Life Simulation's inverse task asks what hidden processes observations support, and whether inferred accounts predict later evidence or transfer beyond their construction setting.

Together the two proposals support a feedback loop: construct a world, render observations, infer an account from the available evidence, compare its predictions with later evidence, and revise the account before constructing further. Correction may change an Event, a decomposition, or a Concept's grounding, rather than merely add detail. The Meaning Model makes those changes addressable and preserves their history; Life Simulation specifies learning objectives and independent tests. Agreement with a construction's own rendering alone does not validate its account of reality.

Imagining the Corpus aligns native text and associated tracks; UnderstandingNodes retain attributed interpretations and revisions. Entangled Alignment supplies the recommended Reader-based training approach, intended to inform the trained model's later writing, dialogue, and action [37, 38]. Life Simulation connects it to evolving Meaning Model worlds and additionally proposes learning from documented world and scene-construction choices. Those histories are additional supervision, distinct from applying Reader-based learning when writing. Whether training improves empathy or aligned conduct remains an empirical question.

9 Conclusion

The Meaning Model makes the developing account of a world the working object of authorship. A coarse life, institution, or physical process can constrain detail that has not yet been constructed. An opening preserves its declared commitments or prompts explicit revision. Concept models, Event descriptions, understanding histories, and narrative participate in the same operation, rather than becoming independently maintained accounts that must later be reconciled.

The six record forms support this coordination without prescribing a universal decomposition. Local Cuts give numerical judgments a comparison context; unweighted processes and externally grounded measurements preserve other kinds of information. Concepts can remain lightly specified or acquire inspectable models in the same grammar as their instances. Exact grounding versions and separate authority paths retain which meaning and whose account a revision concerns. These are the representational changes proposed, not a claim that shared storage or normalization is itself new.

The larger possibility is learning to work in this medium. A model could learn to construct a useful account, deepen it selectively, recognize a poor decomposition, and revise its concepts as well as its conclusions. In the combined program, those practices would support Life Simulation's aligned observation and process histories, reusable problem-solving,

and continuing evaluative interpretation. This paper supplies the construction contracts; the companion specifies how such histories could train those capabilities.

The completed Book exposes both the reach and the boundary of the architecture. It holds one progressively resolved world, its meanings, selected understanding history, and its story in a linked artifact, but the final pragmatic successor was not admitted through the complete atomic protocol and its prose has not undergone independent read-back. The prospective comparison must therefore still test misleading Cuts, inaccessible perspective paths, failed recomposition, maintenance cost, and distinctions the prose does not preserve. The longer-term test is whether learners can use such histories to construct, interpret, and improve world models across unfamiliar situations. The Book begins that program without establishing its predictive, transfer, or alignment claims.

A Book-Specific Profile Vocabulary

These vocabularies are the non-normative profile used by the completed Book construction, not a universal psychology. The preparation documents own their freeze and use. A future scored comparison must freeze their identifiers and one-line descriptions before prose is generated, together with any obvious typed specialization and any exemplar anchor actually used by a judgment. The examples below are available anchors, not a requirement that every Concept use one. A replacement creates a new vocabulary version rather than silently changing an earlier Cut.

Emotion facet	Operational gloss	Anchor example
Joy	Appraisal of wanted gain, connection, or completion	A long-sought, safely accepted success
Sadness	Appraisal of irrevocable or presently unrepaired loss	Receiving credible news of a loved person's death
Fear	Appraisal of threatened loss or harm under uncertainty	Imminent danger with material stakes and incomplete control
Anger	Mobilization against perceived obstruction or violation	A deliberate breach blocking an important commitment
Disgust	Rejection of perceived contamination or profound aversion	Contact with a clearly spoiled substance
Surprise	Response to a material violation of expectation	A strongly expected outcome is suddenly reversed
Trust	Readiness to rely on another under vulnerability	Delegating a consequential task after reliable evidence
Anticipation	Forward attention toward a materially possible outcome	Preparing for a scheduled event with unresolved result
Neutral	No listed facet is materially active at the declared resolution	Routine action with no supported strong appraisal

Table 10: Provisional Plutchik-derived emotion facets plus neutral.

A.1 Atomic-want profile

An atomic want is a construction view over existing Event, Binding, Cut, and provenance records, not a new grammar primitive:

```
AtomicWant { id, parent motivational Event, actor (derived), interval,
    operation, target, desired condition,
    concern, pole, horizon, depth, leaf cut, local leaf weight,
    uncertainty, evidence, provenance }
```

The actor is derived from the parent Event's lifecycle ancestry rather than authored independently. The operation is preserve, create, transform, or end; preserve includes keeping an absent target absent. The target is a registered Thing or Event, including a Thing registered before its lifecycle begins. Its desired condition may name an Event or process state, a categorical fact, or an externally measured field. Satisfaction is derived categorically or by comparison in that field's real unit; a graded assessment uses a local Cut over *satisfied*, *not satisfied*, and remainder. Confidence in that assessment is a separate evidential question, not its degree of satisfaction. The concern and pole fields name the leaf's parents in the first-run WHAT tree. Its local leaf weight is conditional on the opened pole; its full scene path share is the product of concern, pole, and local leaf shares. Views by operation, target, condition kind, horizon, and depth sum these path shares. Context is a separately elicited crossing Cut because one want may span several roles, and conflict is an unweighted typed relation between incompatible leaves unless another declared Cut asks how responsibility for that conflict is distributed.

The top WHAT Cut divides one unit of scene motivational attention. An opened concern divides its own conditional attention among approach, threat-avoidance, and remainder; an opened pole divides its share among want leaves and remainder. All levels use the same motivational Event parent and explicit conditioning slot addresses, not answer labels as parents. At most eight leaves are live for a person in one scene. Remainders at every depth contribute their enclosing path weight to the unresolved scene share. An approach-only view conditions on the resolved approach mass: if concern shares are c_i and their local approach shares are a_i, its entries are $c_i a_i / \sum_j c_j a_j$. Threat-avoidance uses the

same calculation with its pole shares. These views report the conditioning mass; a zero denominator yields no resolved view, or a remainder-only view, never invented proportions.

Satisfaction has two derived readings. World-relative satisfaction compares the desired condition with accepted Events or data beneath History. Believed satisfaction compares it with the condition represented in the actor's own inner-process projection; decisions and appraisals use the latter. Care is an optional leaf type whose target is another person's process or desired condition. It is motive evidence relevant to a kindness judgment, not the definition of kindness: controlling conduct may have a care motive, while kind conduct may arise from duty.

First-run concern	Approach and threat-avoidance readings
Belonging	connection, membership, or recognized inclusion; rejection or exclusion
Competence	effective action, mastery, or achievement; failure or incapacity
Autonomy	self-direction and meaningful control; loss of control or coercion
Understanding	intelligibility, information, and options; the unknown or unpredictability
Well-being	bodily integrity, comfort, and viability; pain or suffering

Table 11: The five concerns shared across principals in the first run. Their remainder tests coverage; the table is not a universal psychology.

The associated HOW vocabulary is framing—concrete or abstract—and deciding—impartial or personal—with a remainder in every Cut. More specific strategy names are Realizations or separately justified Cuts. The first run does not create solver Things or a solver roster.

The initial event-kind registry distinguishes at least lifecycle, presence, membership, physical-part, perception, belief, appraisal, want, decision, action, interaction, communication, travel, consequence, creation, destruction, split, merge, replacement, and succession. These are identifiers and role constraints, not an exhaustive ontology; new kinds require an explicit model revision.

A.2 Capacity and exchange

Capacity uses typed world data only with an external unit, such as available hours, money, or joules; depletion and recovery are updating Events. A Cut may allocate that unit among uses. A transfer binds source, recipient, and any custodian, with conservation or reciprocity asserted only under a shared accounting rule. Subjective "energy" may instead use an inner Event, UnderstandingNode, or attention Cut; it is not presumed conserved. Attention, resource-loss, and social-exchange accounts motivate testable measurements, not another numerical type [39, 40, 41].

A.3 Freeze contract

Any future scored construction must freeze the concept identifiers and one-line descriptions, obvious typed specialization relations, any required exemplar anchors, event kinds, typed-root and ancestry conventions, Cut questions and units, elicitation granularity, remainder policy, composition tolerances, Realization and fit-Cut procedure, typed world-data schemas and units, and evidence visibility rules. A human-life instantiation must additionally freeze its life-process vocabulary, slow–fast declarations, periodization rule, treatment of overlapping episodes, process-boundary criterion, boundary-note requirement, AtomicWant operation and condition conventions, horizon and depth categories, the concern and pole vocabulary with its coverage rule, HOW-module questions, at least two conditional profile definitions per principal, the rule that scene profiles are elicited while compatible slower profiles are duration-derived with coverage reported, context-Cut question, conflict relation, any externally grounded capacity-stock unit and recovery convention, the unit of any effort-allocation Cut, the accounting rule for any exchange Event. Changing any of them creates a new run rather than silently revising the meaning of existing numbers.

If the unscored post-world canonical-model protocol test is run, it separately freezes the model version, full content digest and canonicalization scheme, referenced grounding digests, and comparator version.

B Minimal Interchange Shape

Interchange retains the record fields defined here, exact revisions, grounding digests and their declared canonicalization scheme, clocks, units, frames, evidence, and provenance. Each Cut exports its Event parent, question, unit, keyed siblings, conditioning address, remainder, and recomposition rule together. Authority, occurrence, and reference paths stay distinct; restricted exports withhold values whose required context cannot be disclosed. A refinement includes its base, protected queries, projection, tolerances, and Close result; a revision includes predecessors and active-head

changes. Realizations retain alignment, fit-assessment references, and comparator identity. UnderstandingNodes and DocumentNodes retain text, topology, and source revisions. Prose may render these fields but cannot be their only authoritative copy.

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