Below are precise, P1-style instructions for preparing **bible/blend_rules.yml**. These rules tell the engine *how* to connect mental spaces, *which* operators are allowed, and *when* to stop. They keep blends creative but safe, coherent, and auditable.

Purpose

Define **vital relations**, **operators**, **preferences**, and **constraints** that govern conceptual blending. The generator will: 1) build small input spaces (e.g., a JOURNEY space and a RAW/COOKED axis), 2) map counterparts via vital relations, 3) apply only allowed operators, 4) respect global/frame-specific constraints, 5) emit an **audit trail** (what mapped, why allowed, cost/penalty scores).

What to Prepare (Creator-Curated)

A) Vital relations inventory (IDs + definitions)

Curate 8–14 vital relations you allow the system to compress: - `identity`, `role`, `time`, `space`, `cause_effect`, `part_whole`, `intention`, `change`, `analogy`, `similarity`, `contiguity`. For each, add a one-sentence definition in your own words.

B) Operators (with safety & cost)

List blending operators you permit; give each a **soft cost** (0..1) and safety flag: - Recommended: `projection`, `composition`, `completion`, `elaboration`, `selective_projection`, `fusion` (use sparingly). Optional `allowed_relations` / `disallowed_relations` per operator to narrow usage.

C) Counterpart mapping policy

Rules for how elements align across spaces before blending: - `role_alignment` (e.g., *traveler* ↔ *content?* usually **no**; *traveler* ↔ *agent?* **yes**) - `attribute_alignment` (which features may align: temperature, pressure, brightness, distance ...) - `non_projectable_features` (e.g., proper names, exact counts) - `priority`: list vital relations by preference when multiple alignments are possible.

D) Compression & preference profile

- `allow` vital relations (engine may compress).
- `prefer` vital relations (lower cost).
- `disallow` vital relations (engine must not compress).

E) Global constraints

- `max_blend_depth` (e.g., 2)
- `max_ops_per_blend` (e.g., 4)
- `max_active_axes` (how many bipolar axes may be active concurrently)
- `banned_schema_pairs` / `banned_metaphor_pairs` / `banned_frame_pairs`
- `polar_conflicts` (e.g., RAW & COOKED simultaneously **false**, unless `explosion_fired: true`)

F) Frame-scoped constraints (optional)

Per-frame overrides (e.g., in `journey`, forbid `fusion`, cap ops to 3; in `union_separation`, prefer `role` compression).

G) Scoring model (rewards & penalties)

- `operator_costs`: base costs by operator id
- `penalty`: banned pair, depth overflow, frame incompatibility, polar conflict
- `reward`: frame compatibility, schema alignment, minimality (fewer ops), novelty (cap it)
- `accept_threshold`: 0..1 overall score required to accept a blend

H) Examples (2–3)

Give **one safe** and **one unsafe** example with a tiny audit reason (just text). Engineers turn these into unit tests.

I) Governance metadata

`provenance: {source, curator, license, confidence}`

File Structure & Validation Rules

- Header must include `version`.
- IDs are **lower_snake_case** and unique.
- `cost`, `penalty.*`, `reward.*`, thresholds in `[0,1]`.
- All cross-refs (frames, schemas, metaphors) must exist in their bibles.
- Frame overrides may only reference existing frame IDs and operator IDs.

Minimal YAML Template

```yaml
version: "0.1.0"

vital_relations:
  - id: identity
    definition: "Same entity seen across spaces."
  - id: role
    definition: "Participants aligned by function (agent, patient, path...)."
  - id: time
    definition: "Temporal alignment or compression."
  - id: cause_effect
    definition: "Causal linkage preserved or compressed."
  - id: space
    definition: "Spatial alignment (here/there; near/far)."
  - id: part_whole
    definition: "Membership or inclusion relations."
  - id: intention
    definition: "Goal-directedness alignment."

operators:
  - id: projection
    safe: true
    cost: 0.10
    allowed_relations: [identity, role, time, space]
  - id: composition
    safe: true
    cost: 0.20
    allowed_relations: [role, cause_effect, part_whole]
  - id: completion
    safe: true
    cost: 0.20
    allowed_relations: [analogy, similarity]
  - id: elaboration
    safe: true
    cost: 0.25
  - id: selective_projection
    safe: true
    cost: 0.18
    disallowed_relations: [identity]   # forces choice, avoids total merges
  - id: fusion
    safe: false
    cost: 0.40
    note: "Use rarely; only when frame explicitly allows."

counterpart_mapping:
```

```
  role_alignment:
    allow: [traveler↔agent, goal↔goal, path↔path, boundary↔boundary]
    disallow: [traveler↔content, path↔container_content]
  attribute_alignment:
    allow: [temperature, pressure, brightness, distance]
  non_projectable_features: [proper_name, exact_count]
  priority: [identity, role, cause_effect, time, space]

compression_preferences:
  allow: [identity, role, cause_effect, time, space, part_whole]
  prefer: [role, cause_effect]
  disallow: []

constraints:
  max_blend_depth: 2
  max_ops_per_blend: 4
  max_active_axes: 2
  banned_schema_pairs:
    - [balance, verticality]   # example; remove if not real
  banned_metaphor_pairs: []
  banned_frame_pairs: []
  polar_conflicts:
    raw_cooked:
      simultaneous_false: true
      allow_if_explosion_fired: true

frame_overrides:
  journey:
    disallowed_operators: [fusion]
    max_ops_per_blend: 3
    prefer_relations: [role, space]
  union_separation:
    prefer_relations: [part_whole, boundary]
    operator_cost_adjust: {composition: -0.05}

scoring:
  operator_costs: {projection: 0.10, composition: 0.20, completion: 0.20,
elaboration: 0.25, selective_projection: 0.18, fusion: 0.40}
  penalty:
    banned_pair: 1.0
    depth_overflow: 0.8
    frame_incompatibility: 0.7
    polar_conflict: 0.6
  reward:
    frame_compat: 0.4
    schema_alignment: 0.3
    minimality: 0.2
```

```
    novelty_cap: 0.1
  accept_threshold: 0.55

examples:
  safe:
    description: "Blend JOURNEY (traveler→goal) with RAW pole inside CONTAINER
(pressure rises)."
    audit_hint: "role + cause_effect respected; ops=projection,composition;
score=0.68>0.55"
  unsafe:
    description: "Fuse RAW & COOKED simultaneously without explosion."
    audit_hint: "polar_conflict=0.6 penalty; score=0.31<0.55"

provenance:
  source: "SV_Extended v0.1"
  curator: "Mahyar"
  license: "CC-BY"
  confidence: 0.85
```

Spreadsheet (Optional) → YAML Columns

If you prefer Sheets/CSV, use:

```
vr_id,vr_definition,op_id,op_safe,op_cost,op_allowed_relations,op_disallowed_relations,role_align
```

- JSON columns (e.g., `frame_overrides_json`) hold nested objects/arrays.

Curation Workflow

1) Draft vital relations with clear definitions. 2) Define operators with costs; keep `fusion` rare or disabled unless necessary. 3) Set mapping policy and compression preferences. 4) Add constraints (depth, ops, banned pairs, polar rules). 5) Provide at least one safe/unsafe example. 6) Validate (engineers provide `sv blends validate`). 7) Commit with `data(blend_rules): seed v0.1`.

Quality Checklist (Before Handoff)

- [ ] All IDs are unique and lower_snake_case.
- [ ] Costs/penalties/rewards ∈ [0,1]; thresholds sensible.
- [ ] Frame overrides reference existing frame and operator IDs.

- [ ] Banned pairs only reference existing schemas/metaphors/frames.
- [ ] At least one safe and one unsafe example present.
- [ ] Provenance filled.

Common Pitfalls

- Letting `fusion` become the default (destroys structure). Keep it expensive or banned.
- Compressing `identity` and `role` simultaneously without justification (over-merging).
- Allowing polar conflicts (e.g., RAW & COOKED) outside the intended **explosion** beat.
- Unbounded depth/ops leading to incoherent blends.

Hand-Off Note to Engineering

- Treat this file as **read-only** curated data.
- Validators should check ranges, cross-refs, and that overrides reference valid IDs.
- The engine will compute a **blend score**: `reward − (operator_costs + penalties)`; accept if `≥ accept_threshold`.
- The audit trail should list: chosen counterparts, operators used, relation compressions, scores, and any triggered penalties/rewards.