

I · V · O

VALIDATION REPORT

Asymmetry Ring — Feedback Laboratory

- I. Actuator Validation** — *Can target configurations be reached reliably?*
- II. Field Behaviour Validation** — *Do targets produce predicted emergent dynamics?*
- III. Notation Validation** — *Can observers consistently recognise and describe states?*

Design by Authenticity · 2026

I·V·O Matrix v3.5 · Asymmetry Ring V3.0

I. Actuator Validation

Research question: *Can the feedback loop reliably steer the visual field toward each target configuration in the IVO Matrix?*

Method

The actuator in target.js applies an exponential approach each frame:

```
next = current + (target - current) × STEP_RATE
```

Parameters: STEP_RATE = 0.08 · dead zone = 0.02 · convergence threshold = 5% normalised distance · max 600 frames (~10s at 60fps).

All 17 Matrix configurations were tested against 8 named starting positions (all-min, all-max, mid-point, crisis state, recovery state, fragmented, low activation, stable forward) plus 30 random starts — 37 total per target.

Results

Finding All 17 configurations converge from all 37 starting positions. Convergence rate: 100% across 629 test runs.

Configuration	Group	Params	Mean steps	P90 steps	Init. dist.	Conv. rate
I > []	Basic	7	20	24	28%	100%
I > 0	Basic	7	22	26	30%	100%
I > ∞	Basic	7	22	26	32%	100%
? ☉ 0	Searching	7	23	27	32%	100%
I ~ ∞	Searching	7	23	28	35%	100%
· > 0	Searching	7	23	27	34%	100%
☉ 0	Searching	5	23	28	35%	100%
I ) (	Pressure	4	22	27	31%	100%
? ~ ) (	Pressure	7	22	25	32%	100%
* >> ) (	Pressure	7	23	28	35%	100%
☉ ) (	Pressure	5	23	27	35%	100%
! >> ) (	Crisis	7	24	29	37%	100%
: >> ) (	Crisis	7	24	29	36%	100%
! ↓ ) (	Crisis	7	25	28	38%	100%
· ↓ ) (	Crisis	7	24	28	39%	100%
! ↓ ∞	Recovery	7	26	28	41%	100%
# × []	Rare	4	26	30	41%	100%

Key observations

Speed range: Basic targets converge in 20–22 steps (~0.33s). Recovery and Rare targets take 26–27 steps (~0.45s). The spread across all configurations is only 30%.

Hardest starting position: all-max is the hardest start for 14 of 17 targets. The three exceptions (* >>) (, ! >>) (, # × []) are hardest from all-min, because they require high population and high speed.

Partial configurations: Configurations with fewer steered parameters (n=4–5) converge slightly faster than full I+V+O configurations (n=7) — fewer dimensions to travel.

Limitation This report measures parameter convergence only. Whether the physics engine shows the predicted IVO state once sliders arrive is addressed in Report II.

Conclusions — Actuator

- The actuator is mechanically reliable. Every target is reachable from any starting position.
- Convergence is fast: all targets reached within 0.5 seconds in the worst case.
- No targets require special initialisation. The loop can start from any state.
- Basic configurations (I > O, I > [], I > ∞) are fastest — best suited as onboarding defaults.
- Crisis targets are the slowest convergence group, consistent with their position far from average parameter space.

II. Field Behaviour Validation

Research question: *When sliders reach target values, does the visual field actually show the IVO state the Matrix predicts?*

What this validation measures

Report I confirmed parameter convergence. This report addresses the calibration question: are the parameter targets correctly mapped to emergent field behaviour? A target can be mechanically reached while the physics engine shows a different state than the label implies.

The gap Actuator convergence is necessary but not sufficient. The physics simulation mediates between slider values and observable field state. That mediation has not yet been empirically verified.

Method

For each configuration, the predicted field state is translated into measurable metric thresholds — the same thresholds notation.js uses to produce IVO glyphs. Validated = after actuator convergence, live metrics consistently produce the same glyph as the target label.

Status categories:

- Testable — all threshold conditions are directly specified in notation.js
- Partial — one or more IVO layers not steered; metric test incomplete
- Temporal — predicted behaviour is a transition event, not a static state

Prediction table

Configuration	Predicted field behaviour	Measurable via metrics.js	Status
I > 0	Ring structure, coherent movement, moderate radius	alignment > 0.62, isolation < 0.15	Testable
I > ∞	Wide ring or distributed cloud, low tension, open	alignment > 0.50, tension < 0.25, isolation < 0.20	Testable
! >> ) (	Dense cluster, high speed, tight radius, chaotic edge	dominance > 0.65, alignment > 0.72, tension > 0.55	Testable
! ↓ ∞	Dispersing cluster, decreasing speed, opening radius	dominance falling, tension < 0.35, variance rising	Testable
∪ ) (	Units looping tightly, low migration, persistent pattern	attractorLock > 0.60, migration < 0.15	Testable
? ~ ) (	Fragmented movement, fluctuating direction, tight radius	variance > 0.50, isolation > 0.30	Testable
I ) (	Stable units; V not steered — only o_rad targeted	Partial: O+I measured, V unsteered	Partial

Configuration	Predicted field behaviour	Measurable via metrics.js	Status
⊙	Variance spike then alignment recovery (transition event)	variance spike then alignment > 0.50 within 5s window	Temporal
# × []	Saturated dense state; constrained by [] field	dominance > 0.75; only n_units + o_rad steered	Partial

Structural observations

1. The V-layer is the hardest to validate

V-symbols steer `v_spd`, `v_wid`, and `o_pol`. These affect movement and scatter, but `notation.js` reads V from derived metrics: alignment, variance, migration, attractorLock. The translation from slider to metric is mediated by the physics simulation. High `v_spd` does not automatically produce high alignment — it depends on unit density, radius, and field shape. This is the primary calibration risk.

2. Partial configurations leave V unsteered

`I) (` and `# × []` have no V-symbol in the target. The actuator steers only I and O parameters. V is determined by whatever the field is already doing — the notation reading for V will vary across sessions.

3. Transition states require time-series measurement

⊙ is a reorientation event, not a resting state. Validation requires measuring a variance spike (> 0.40) followed by alignment recovery (> 0.50) within a fixed time window after actuator convergence. Static metric snapshots are insufficient.

Open calibration questions

- Do high-speed targets (>> V-symbol) consistently produce alignment > 0.72 across different O-shapes?
- Does tight radius (`o_rad` < 0.25) reliably produce the `) (` field signature, or does it depend on unit count?
- Is `! ↓ ∞` distinguishable from `I > ∞` once the field settles — or do they converge to the same visual state?
- Does the eigenstate condition interact with target-driven convergence? Does the loop prevent natural eigenstates from forming?

Recommended next step Run each target live in the Asymmetry Ring. Export Timeline JSON after 300 frames of convergence. Compare actual glyph sequence against target label. Target: ≥ 80% concordance on Basic and Pressure configurations.

Conclusions — Field Behaviour

- Field Behaviour Validation cannot be completed by simulation. It requires live metric readings from the physics engine.
- 6 of 9 representative configurations have fully testable predictions via existing metric thresholds.
- 2 configurations (`I) (`, `# × []`) are partially testable — V-layer not steered.

- 1 configuration (☉ O) requires temporal measurement — not a static threshold test.
- The V-layer is the primary calibration risk: the relationship between slider values and alignment/variance metrics is physics-dependent and unverified.

III. Notation Validation

Research question: *Can observers — with or without training — consistently assign the same IVO notation to the same visual field state?*

What this validation measures

The IVO notation is an observation language. Its validity depends on whether human observers read the field consistently — not only whether the technical system produces correct symbols. Notation Validation tests:

- Recognition reliability: do observers assign the same symbol to the same visible state?
- Lens stability: does meaning remain consistent across Simple / Reflective / Technical modes?
- Boundary sensitivity: are adjacent symbols distinguishable in practice?

Expected recognition patterns by layer

Layer	Expected high agreement	Expected low agreement	Hypothesis
I — observation	<ul style="list-style-type: none"> ✓ | (stable) ✓ ! (alarm) ✓ # (overflow) 	<ul style="list-style-type: none"> △ · vs • (minimal vs present) △ : vs ? (fragmented vs searching) 	<i>Extremes readable; centre band ambiguous</i>
V — vector	<ul style="list-style-type: none"> ✓ >> (momentum) ✓ ↑ (rising) ✓ ↓ (decreasing) 	<ul style="list-style-type: none"> △ ~ vs ∪ (fluctuation vs persistent loop) △ ⊙ vs > (reorient vs forward) 	<i>Direction readable; pattern recognition harder</i>
O — field	<ul style="list-style-type: none"> ✓ ∞ (expansive) ✓)((tense/repellent) ✓ × (blockage) 	<ul style="list-style-type: none"> △ O vs () (enclosed vs protected) △ ~ vs : (unstable vs fragmented) 	<i>Extremes clear; structural nuance needs training</i>

Boundary zones — primary risk areas

· vs • (minimal vs present)

Both describe low-intensity I-states. The distinction is a threshold — barely detectable vs. measurably active. Observers without training will likely conflate these. Recommended fix: add a concrete field description to the Simple legend (e.g. "· = nothing is moving; • = something stirs").

~ vs ∪ (fluctuation vs persistent loop)

Both show irregular movement. The critical distinction is temporal: ∪ requires recognising that the same pattern has returned, not just that movement is chaotic. This is a time-series judgment, not readable from a single frame. Validation protocol must include short recordings, not still images.

O vs () (enclosed vs protected)

Both describe coherent fields. The difference is active containment — () implies boundary pressure, O implies natural coherence. This distinction may require contextual cues not visible in a single frame. Possible solution: include vector field arrows or tension indicators in the HUD.

Proposed validation protocol

Study design

Show 25 field screenshots or 5–10 second recordings to 5–10 observers. Half trained (IVO orientation received), half untrained (symbol reference card only). Observers assign I, V, and O symbols independently. Measure agreement using Fleiss' kappa (κ) per layer.

Acceptance thresholds (Landis & Koch, 1977)

κ range	Interpretation	IVO implication
$\kappa < 0.40$	Poor / fair	Symbol needs redesign or removal
$0.40 \leq \kappa < 0.60$	Moderate	Boundary definition needed; add to Design Principles
$0.60 \leq \kappa < 0.80$	Substantial	Acceptable for operational use
$\kappa \geq 0.80$	Almost perfect	Self-evident symbol; use as training anchor

Priority test pairs

- vs • — I-layer threshold sensitivity
- ~ vs ∪ — V-layer temporal pattern distinction
- O vs () — O-layer containment inference
- I > O vs I > ∞ — full configuration distinction (radius only differs)
- ! ↓)(vs • ↓)(— same V+O, different I (alarm vs minimal)

Lens mode interaction

Notation Validation must be conducted per lens mode independently. Hypothesis: Technical-lens observers will show higher agreement on I and V symbols (direct metric correspondence). Simple-lens observers may show higher agreement on O symbols (field quality is more intuitively readable than measurement). Testing this interaction directly validates — or challenges — the Design Principle "notation is stable, words are translations."

Design Principle alignment If symbol recognition varies systematically by lens mode, the principle "Notation is stable" may need qualification in the Design Principles sheet.

Conclusions — Notation

- Notation Validation requires a structured human study. It cannot be derived from simulation or code alone.
- Symbol extremes (! vs •, >> vs ↓, ∞ vs ×) are expected to be highly recognisable without training.
- Boundary zones (• vs •, ~ vs ∪, O vs ()) are the primary empirical priority.
- $\kappa \geq 0.60$ is the acceptance threshold for operational use. $\kappa \geq 0.80$ justifies use as a calibration anchor.
- Lens mode interaction (Simple / Reflective / Technical) should be an independent variable in the first study.

IV. Summary and Research Agenda

Validation status overview

Report	Question	Status	Next step
I. Actuator	Can targets be reached?	✓ Complete — 100% convergence (simulation)	Monitor edge cases in live sessions
II. Field Behaviour	Do targets produce predicted dynamics?	🟡 Partial — predictions defined; not yet verified live	Timeline JSON export per target
III. Notation	Can observers read states reliably?	○ Not started — protocol defined	Run 5–10 observer inter-rater study

Priority research agenda

Short term — within current version

- Run all 17 targets live in the Asymmetry Ring. Export Timeline JSON after actuator convergence. Calculate glyph concordance rate (actual notation vs. target label). Target: ≥ 80% concordance on Basic and Pressure configurations.
- Identify V-layer calibration gaps: record which configurations consistently produce unexpected V-readings after convergence. Adjust MAP_V in target.js accordingly.
- Test Ⓞ as a temporal event: design a 5-second recording protocol and verify the variance-spike-then-alignment signature in the exported metrics.

Medium term — next release

- Notation inter-rater study: 8 observers, 25 field screenshots, 3 lens modes. Measure Fleiss' κ per symbol per layer. Publish results in the Design Principles sheet as empirical footnotes.
- Investigate the eigenstate interaction: does active target-driven convergence suppress eigenstate formation? Test by running each Basic target with loop off vs. loop on and measuring geometric identity duration.
- Calibrate partial configurations (I), (# × []): add V-symbol defaults for these targets, or explicitly document in the Matrix that V is unsteered and the notation reading will vary.

Open research questions (from Technical Reference, IVO Feedback Laboratory Guide)

- Are composite shapes (ring + cluster-core) reproducible from the same initial conditions?
- Does the spiral potential support eigenstates, or does motion prevent identity convergence?
- Is there a parameter region where the system reaches eigenstate without any target set?
- What is the relationship between i_cpl (set manually) and eigenstate emergence?

Methodological note

The three validation streams are independent but interconnected. A notation symbol that is not reliably recognisable (Report III fails) should not be the target of an actuator configuration (Report I) regardless of whether the parameter mapping is correct (Report II). The recommended validation

order for clinical or research use is III → II → I: the question of whether humans can read it comes before the question of whether the system can produce it.

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