IQ Mindware (Capacity-Strategy) Training with H-AGI - for Increasing General Intelligence.

The **capacity + strategy ("IQ-Mindware")** stack is exactly what the Trident G-Loop predicts should produce **far transfer**: the capacity track tunes the controllers (F*, b via d−d*, T(χ), λ, η, χ), while the strategy track installs reusable **φ-level** and **$\mathcal{J}$-level** procedures (maps, constraints, EU/Bayes) that generalise across tasks. Together they expand **r** and **G_f**, hence **$\mathcal{G}$ = r × G_f**.

Note that the IQ (capacity) games to select from are (we could choose to select just 2 if it makes sense):

1. Classic Dual N-back - letters and location in grid. 2. Logi Gated Dual N-back (here there is a cue during the classic dual n-back, to only respond to a match based on a logic gate - either AND, OR or XOR for the two modalities). This requires a comparison between the two modalities to make the decision. 3. Non-Categorical Dual N-back - 8 random, unique shapes of multiple colours generated each training session which move in random locations on a disk. The task is n-back matches for both shape identity and for location (same game logic as the DNB). 4. Emotional DNB - with emotional stroop like colour matches of words (many of which are emotionally charged/negative) combined with location match of face with emotional expressions (many of which are angry). The player should ignore the meanings of the central word - just matching on word colour, and ignore the facial expression, just matchinng on lcation).

Game	G-Loop levers & networks (what it hits)	Trains (capacity → controller)	Likely far transfer (why)
1) Classic Dual N-Back	Control prong (FPCN-B + DAN) under steady **b**↑ (stability), short-term WM maintenance and rapid rule execution; salience monitors but minimal branching.	Updating, simple interference control; steadier **$\Delta\hat{F}$** tracking and τ½ (re-entry) at moderate difficulty.	Near→mid transfer: span/updating, simple reasoning speed; modest Gf uplift unless coupled to mindware/Map-level work.

2) Logi-Gated Dual N-Back (AND/OR/XOR)	Control prong **plus** explicit **constraint satisfaction** at Gate/Decide; tight FPCN-B maintenance with salience-led arbitration under load; strengthens **b↑** precision and λ↑ propagation only when constraints pass.	Rule binding across modalities, conflict monitoring, feasibility gating; cleaner **Ψ-sieve** and lower hysteresis HΨ.	**Far transfer to Gf** (multi-rule matrix problems), syllogistic/conditional logic, programming-like constraint reasoning; better policy selection under constraints.
3) Non-Categorical Dual N-Back (random coloured shapes on a disc)	Pushes **Map (ϕ)** + Control handoff: less chunkable categories → stronger hippocampal **pattern separation** and SR-style mapping before recompress; trains Creative↔Control micro-switches with **b≈0→b↑** and λ control.	Feature-agnostic selection, relational binding without verbal crutches, spatial attention; improves ΩΨ (band occupancy) at higher novelty.	**Far transfer to fluid pattern reasoning** (novel matrices/visual analogies), mental rotation, robust perception under feature drift; better generalisation (λ↑) once validated.
4) Emotional DNB (colour-word & face-location)	Trains **salience-arbitrated gating** under affective load: ignore meaning/expression → stabilize task set as **T(χ)↓** despite χ spikes; resilience axis r (ΔF̂ control) under stress.	Emotional interference control, arousal/uncertainty regulation, faster recovery **τ½↓**; stronger re-entry and lower hysteresis with χ-jitter.	Far transfer to **decision-making under pressure**, test anxiety contexts, executive function with affect; boosts $\mathcal{G}$ via r (resilience) more than "pure" Gf.

Ranking for "increase IQ" (most → least), with the Trident-G rationale

1. **Logi-Gated Dual N-Back**
   Best for Gf/"IQ" because it mixes WM load with *explicit logical arbitration* (AND/OR/XOR) and feasibility gating—the same Control-path mechanics used in matrix

reasoning and multi-rule problem solving. Expect bigger gains in the inference axis (cleaner **b**↑, λ↑ only when constraints pass) and lower hysteresis.

2. **Non-Categorical Dual N-Back**
   Closes in on **map-level** relational processing by denying categorical/verbal shortcuts; that pressures hippocampal separation and flexible recompression—prime ingredients for *novel pattern* Gf tasks. It likely edges classic DNB for far transfer to unseen structures.

3. **Emotional DNB**
   A potent **resilience** builder (r axis): salience/uncertainty regulation under affect improves ΩΨ and τ½—raising *effective IQ in the wild*. On psychometric Gf it's additive, but probably a touch behind #1–2 unless your IQ battery is stress-laden.

4. **Classic Dual N-Back**
   Solid near-transfer and some Gf spillover, but without logic gates, category-agnostic stimuli, or affective salience it trains fewer *far-transfer* controllers. Best used as the **baseline** capacity block.

Make them transfer even more (tiny tweaks)

- **Keep the Ψ-Core on**: log **ΩΨ, τ½, HΨ, μF*** each session; inject **χ-jitter** bursts and practise orient→reset→reconfigure to tighten re-entry.

- **Pair with mindware** (10–12 min): e.g., *constraint propagation mini-lesson* on Logi-Gated days; *analogy/SR gist* on Non-Categorical days. Capacity×Strategy is the combo your framework predicts for durable **far transfer** (r↑ and G_f↑).

Why it should work (mapped to the G-Loop)

- **Capacity track (mechanics):** adaptive WM/attention, χ/η sensitivity drills, and resilience challenges keep $\mathcal{E}\approx F^*$ and improve fast **mode-gating** ($\Delta\hat{F} = \kappa(\mathcal{E}-F^*)$). This widens the **resilience range (r)** and speeds **τ½** recovery.

- **Strategy track (mindware):** explicit **EU, Bayes, causal/constraint toolkits, analogy, counterfactual playbooks** operate in **Phase-3 Map** and **Decide/Gate**, increasing the

controllable span of **b/T/λ** with performance preserved—i.e., the **inference range (G_f)**.

- **Integrated effect:** more time inside **Ψ** (higher **Ω_Ψ**), cleaner re-entry (**low H_Ψ**), upward drift of **F*** via **η** (Gf→Gc consolidation) → durable far transfer.

Practical design (concise)

Daily micro-cycle (≈30 min)

1. **Mechanics (10'):** adaptive **relational dual n-back**, task-switching with distractors, χ-jitter probes (raise T when χ↑), "resilience sprints" (brief over/under-challenge then re-centre).

2. **Mindware mini-lesson (8'):** one compact rule set (e.g., base-rate Bayes; expected utility with constraints; simple DAG/backdoor).

3. **Synthesis challenge (12'):** a short problem that **forces the rule onto the drill** (e.g., pick the most informative probe using EU or expected information gain, then execute under WM load). Log **mode time** (Control vs Creative), **$\Delta\hat{F}$ occupancy**, and **errors under χ-jitter**.

Weekly arc (example, 6–8 weeks)

- W1–2: gating basics ($\mathcal{E}$/F*, χ→T), Bayes (diagnosticity), analogy scaffolds.

- W3–4: constraint satisfaction & trust-regions; EU under limits; map (de)compression drills.

- W5–6: causal inference (backdoor, IV intuition) + counterfactual rollouts; stochastic control under noise.

- W7–8: integration blocks (multi-step cases mixing verbal/visual/quant); timed re-entry tasks for resilience.

Adaptive engine (how it stays in the Ψ-band)

- **RL pacing:** treat tasks as arms; pick next difficulty that maximises **η-gain** while holding **$\mathcal{E}\approx F^*$** (auto-difficulty).

- **Controller hooks:** adjust **$b = \beta_d(d-d^*)$** to bias Control↔Creative, lift **$T(\chi)$** when $\chi\uparrow$, and modulate **λ** (sandbox vs propagate). Telemetry feeds the scheduler.

What to measure (transfer-ready)

- **Ψ-profile: r, G_f, Ω_Ψ, $\tau_{1/2}$, H_Ψ, μ_{F^*}** (session logs + periodic probes).

- **Task outcomes:** out-of-set reasoning (novel matrix/analogy/quant cases), decision quality under uncertainty (Bayes/EU cases), **re-entry speed** after perturbations, and **generalisation** (λ-sensitive near vs far tasks). Expect **$r\uparrow$, $G_f\uparrow$, $\Omega_\Psi\uparrow$, $\tau_{1/2}\downarrow$, $H_\Psi\downarrow$, $\mu_{F^*}\uparrow$**.

Validation plan (lean but strong)

Run an A/B with **capacity-only** vs **capacity + mindware** (yours). Pre-register **primary endpoints** on the Ψ-profile plus cross-domain problem sets; include an **active control** to rule out expectancy. Qualitative expected pattern: capacity-only → near transfer + some r gains; capacity + mindware → **far transfer** with **both r and G_f** gains and better re-entry/hysteresis.

Risks & guardrails

- **Drill overfitting** → keep **synthesis** every session.

- **Cognitive fatigue** → micro-cycles with brief monitor pulses (orient–reset–reconfigure) and strict **$\mathcal{E}/F^*$** control.

- **Strategy inertness** → always pair a rule with an immediate **counterfactual decision** inside the drill.

Mindware/Strategy Pillars

- **Notation sync:** use $\mathcal{E}_t$ (experienced demand), $\mathbf{\Delta\hat{F}_t = \kappa(\mathcal{E}_t - F^*)}$, **b = β_d(d−d*)**, **T(χ)**, **λ**. Replace any old "E/fusion node" with $\mathcal{E}_t$.

- **Gate kit (before each block):** compute $\mathcal{E}_t$ and $\Delta\hat{F}_t$ → choose **Creative** (T↑, b↓) vs **Control** (T↓, b↑). After the block, log **η, χ**, update **F*** if η↑, and record **Ω_Ψ, τ½, H_Ψ**.

- **Policy scoring:** use neutral $\mathcal{J}$ (EV or −G_EFE) with a **lexicographic Ψ-sieve** (prune any option with Ψ-proximity < threshold before softmax).

- **λ control:** treat transfer width as a first-class knob—**sandbox (λ↓)** when ΔΨ<0 or critics complain; **propagate (λ↑)** when ΔΨ≥0 and η↑.

Pillar-by-pillar adjustments (concise)

Pillar 1 — Causal Structure & Identification

- **[1] DAG + refuter:** After choosing a refuter, run the **Ψ-sieve** (no consolidation if predicted ΔΨ<0).

- **[2] Counterfactual rehearsal:** rename "at E (fusion node)" → "at $\mathcal{E}_t$"; gate the IF/THEN by $\mathbf{\Delta\hat{F}_t}$ (boredom route vs error route).

- **[3] A/B mini-experiments:** TD update **η_task**; if χ stays high → **T(χ)**↑ next trial; if η↑ and ΔΨ≥0 → **F***↑ slightly (auto-difficulty).

- **[4] Pre-mortem:** surface threats that raise $\mathbf{U_t}$; if high-U_t + high cost, force **Creative** probe first (T↑, b↓) before committing.

Pillar 2 — Abductive Compression

- **[5] Hypothesis triad + MDL:** lock only if **η↑** and **ΔΨ≥0**; if edge cases fail, **λ↓** and retry (sandbox the rule).

- **[6] Gist mapping:** grant η-boost **only if** ΔΨ≥0 and parity critics don't spike; otherwise tag for a **refuter** in Pillar 1.

Pillar 3 — Deductive Constraint Propagation & Invariance

- **[7] Logic + unit tests:** keep the embodiment checks (agency floor, reciprocity, distributional stability, reversibility) as **non-negotiable guards** before Consolidate.
- **[8] Bayesian update:** compute **χ_total** (your split uncertainty) → drive **T(χ)**; raise **T** if χ_total↑, cool if ↓; store **η_axes** explicitly.
- **[9] Expected Utility choice:** evaluate with $\mathcal{J}$; apply the **Ψ-sieve** first; if EU↑ but ΔΨ<0, route to a **refuter** and **λ↓** for transfer.
- **[10] Pareto prioritisation:** keep Pareto+Ψ; add a **rollback bound** hook (if predicted rollback cost > C_max, auto-sandbox: λ↓).

Pillar 4 — Relational Abstraction & Analogy

- **[11] Structure mapping:** keep role-swap & reciprocity checks; require **ΔΨ≥0** to accept a mapping; otherwise **bump Creative** for a reframe.
- **[12] SR "predict & verify":** already perfect—explicitly **contract/expand λ** based on realised Ψ-trajectory; if states correct but Ψ↓ → send the rule back to a refuter (Pillar 1).

Meta Pillar

Ψ-Core = daily micro-drills that tune **F***, **$\Delta\hat{F}_t = \kappa(\mathcal{E}_t - F^*)$**, **b = β_d(d−d*)**, **T(χ)** and **λ** so every other pillar runs inside the Ψ-band and re-enters cleanly after perturbations.

Placement

Use a **quincunx**: Ψ-Core in the centre; the four pillars at the corners. It feeds all pillars (capacity → strategy glue) and is always-on, 10'/day.

Minimal protocol (10 minutes, universal)

1. **Adaptive WM/attention (4')**

    - e.g., relational dual n-back or task-switch with distractors.
    - Aim: widen **r**, stabilise **b** under load.
2. **χ-jitter re-entry (3')**
    - Inject brief uncertainty spikes; practise **orient–reset–reconfigure** to drive **τ½↓** and **H_Ψ↓**.
3. **Gate tuning (3')**
    - Deliberately toggle **Creative** (T↑, b↓) ↔ **Control** (T↓, b↑) on small problems; adjust **λ** (sandbox vs propagate).

Log: Ω_Ψ, **τ½**, **H_Ψ**, **μ_{F*}**, plus session **η, χ**.

How Ψ-Core supports each pillar

- **P1 Causal/ID:** steadier gating under shocks; faster refuter cycles (χ-driven T adjustments).
- **P2 Abductive Compression:** reliable λ control (shrink on ΔΨ<0, expand on ΔΨ≥0), higher η gains without coverage loss.
- **P3 Deductive & Invariance:** cooler **T(χ)** during Bayesian updates; fewer brittle passes through the Ψ-sieve.
- **P4 Relational/Analogy:** smoother Creative→Control hand-off; better re-entry when a mapping drops Ψ.

Verdict: Call it **Ψ-Core (Gate & Resilience Mechanics)**, put it in the **centre** of the quincunx, and treat it as a **meta-pillar** that powers all four—not an independent fifth content pillar.

Course skeleton (stand-alone)

- **Module 0 — Meta-strategy (Ψ-sieve & gate)**
    - Teach the **Ψ-sieve** (prune options that drop Ψ), **$\Delta\hat{F}$** awareness (am I under/over challenged?), and basic **gate** moves (Creative: T↑, b↓; Control: T↓, b↑).
    - Optional: a 3–5 min "Ψ-Core warm-up" per session (not mandatory capacity training).
- **Modules 1–4 — The Four Pillars**
    - **P1 Causal Structure & Identification:** [1] DAG+refuter, [2] IF/THEN counterfactuals, [3] A/B mini-experiments, [4] Pre-mortems.
    - **P2 Abductive Compression:** [5] Triad + MDL, [6] Gist/concept mapping.
    - **P3 Deductive Constraints & Invariance:** [7] Logic + unit tests + embodiment guards, [8] Bayesian update, [9] EU choice, [10] Pareto+Ψ.
    - **P4 Relational Abstraction & Analogy:** [11] Structure mapping, [12] SR predict-&-verify (with λ expand/contract).

Cadence (6–8 weeks): 2 strategies/week → 12 units + meta-strategy.

Session recipe (90 min, repeatable)

1. **Micro-primer (10 min):** one rule (e.g., backdoor, base-rate Bayes, ΔΨ check).
2. **Guided demo (15 min):** walk a small case; show **Ψ-sieve** before/after.
3. **Case lab (45 min):** verbal, visuospatial, quantitative mini-cases; require (i) one refuter or unit test, (ii) a Ψ statement for the chosen action, (iii) λ decision (sandbox vs propagate).
4. **Reflection (20 min):** log **η** gain (what compressed?), **χ** state (what stayed uncertain?), and gate choice (why Creative/Control?).

Assessments & telemetry (no capacity drills needed)

- **Pre/Post battery:**
    - Causal ID (DAG/backdoor choice), Bayes/EU problems under time, invariance/unit-test items, analogy mapping to remote domains.
- **Process metrics:** count valid refuters used, % options removed by Ψ-sieve, λ decisions (expand/contract), decision quality under induced ambiguity, re-entry notes (brief narrative on switching modes).
- **Outcome signals:** improved accuracy, fewer violated constraints, faster convergence to a compressed rule set (η↑), better option hygiene (ΔΨ≥0 choices).

What to promise (and what not)

- **Expect:** better cross-domain problem solving, cleaner decisions under uncertainty, faster "map → decide" cycles—i.e., **G_f**↑.
- **Don't oversell:** WM span or attentional stamina gains (that's the capacity track). You can *optionally* suggest a 10-minute **Ψ-Core** warm-up for students who want resilience benefits (**r**↑).

Packaging tips

- Keep every unit "rule → refuter → Ψ check → commit or sandbox (λ)"—the same micro-loop across domains.
- Use mixed modalities (text, diagram, small tables) so skills travel.
- Include one **counterfactual choice** in *every* assignment (forces application, not just description).

Bottom line: run the mindware course independently now. It will expand **G_f** on its own; later, bolt on the capacity/Ψ-Core track to multiply gains into $\mathcal{G} = \mathbf{r} \times \mathbf{G\_f}$.