**Study C — Collapse/Reentry Backbone: Thalamus ↔ DMN ↔ Salience Network**

**Title**

A Triadic Model of Phase Change: Thalamic Gating of DMN–SN Switching During Disruption and Guided Reentry

**Rationale (WFT → Neural)**

WFT predicts a backbone for phase change: SN detects disruption (collapse onset), thalamus gates synchrony, DMN supports metabolization; guided reentry should normalize triadic dynamics.

**Hypotheses**

1. **Disruption:** Mild cognitive/emotional disruption increases SN→DMN effective connectivity and reduces thalamus→DMN coupling.
2. **Reentry:** Brief ritualized breath cadence restores thalamus→DMN coupling and reduces aberrant SN→DMN drive.
3. **Behavioral link:** Magnitude of triadic normalization predicts faster subjective recovery and task performance rebound.

**Design**

* Within‑subject A–B–A: Baseline → Disruption → Reentry; counterbalanced disruptor types (cognitive conflict; affective ambiguity).

**Participants**

* N=48 healthy adults.

**Tasks/Stimuli**

* **Disruption blocks:** (i) unsolved anagram sets with time pressure; (ii) ambiguous social feedback clips (non‑traumatic).
* **Reentry:** 2‑min paced breathing (6 cpm) + 30s stillness.

**Measures**

* 7T fMRI (thalamic nuclei: MD, ATN, pulvinar); 3T acceptable with optimized subcortical pipeline.
* Network nodes: DMN (mPFC, PCC, hippocampus), SN (aINS, dACC).
* Physiology: HRV, respiration.
* Subjective: momentary distress, recovery time.

**Procedure**

1. Baseline rest (5 min).
2. Disruption Block A (cognitive) → Reentry.
3. Disruption Block B (affective) → Reentry.
4. Post‑scan recovery + debrief.

**Primary Outcomes**

* Spectral DCM estimates: SN→DMN, thalamus→DMN per block; Δ(Reentry‑Disruption).

**Secondary Outcomes**

* HRV restoration; subjective recovery latency; correlations with DCM changes.

**Analysis Plan**

* First‑level GLMs; ROI extraction; spectral DCM across triad; within‑subject contrasts.
* Mediation: Reentry effect on recovery mediated by thalamus→DMN normalization.

**Power & N**

* Simulation‑based DCM power (pilot n≈12) to target Δ connectivity of medium size; planned N=48 after attrition.

**Exclusions**

* Excess motion; inability to follow breath pacing; physiological data loss.

**Prereg Items**

* ROI definitions; disruptor stimuli lists; DCM model space; breath cadence; primary contrasts; recovery metrics.

**Ethics & Safety**

* Non‑traumatic disruptors; monitoring; immediate abort option.

**Reentry Protocol**

* Paced breath after each disruptor; post‑scan guided grounding; follow‑up check if needed.

**Data/Code**

* BIDS; DCM model space shared; prereg on OSF; analysis scripts public.

**Notes for All Studies**

* **Blinding:** Analysts blinded to condition/group where feasible.
* **Multiple Comparisons:** Limit to prereg ROIs; FDR for exploratory.
* **Reporting:** Deviations from prereg documented; null results reported.
* **Generalization:** Templates are modular—swap tasks for population‑specific variants (e.g., grief instead of trauma; dyadic tasks for Wₑ).