Who Benefits from Scientific Entrepreneurship Training?

Diagnostic Results: Attrition, Multiple Outcomes, Theory Component — v6

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Where we stand. The main GenericML scanner (v5) tested 12 moderators across cognitive, venture, and belief-calibration dimensions on ΔSI. All 12 were null ($p > 0.20$, 250 splits each). This note reports three diagnostic analyses run to understand whether heterogeneity exists along other dimensions before deciding on the paper's framing.

D1 — Attrition deep-dive.

What we did. Using the full panel ($N_{\text{baseline}} = 1{,}187$ across 3 arms), we computed retention rates by arm × period, estimated the ATE trajectory (mean ΔSI by arm and period), and ran a logit of attrition on arm dummies and site fixed effects for each follow-up period. We also compared baseline characteristics of stayers vs. droppers by arm.

What we found.

- **Retention by period 3:** Control 22.6% · T&E 44.4% · Evidence-Based 50.8%. The control arm loses 77% of its sample by period 3; treated arms lose 50–55%.
- **Differential attrition is large and highly significant.** T&E and Evidence-Based founders are ≈32 percentage points *less* likely to drop out than control at every follow-up period (logit AME ≈ −0.32, $p < 10^{-10}$).
- **The ATE "fade-out" is not reversion—it is control-group recovery.** The control arm's mean ΔSI is *negative* in periods 1–3 (−0.34, −0.39, −0.17) before recovering to near zero in periods 4–5. T&E is positive in periods 1–2 (+0.26, +0.20) and also near zero in periods 3–5. The effect disappears because the control group drifts back up, not because the treated group reverts.
- **Selective survival.** In treated arms, stayers are systematically older, more experienced, and more ambitious than droppers (e.g., `work_experience_year` $p = 0.003$; `idea_aspiration_1` $p < 0.001$ in EB). Control stayer/dropper differences are mostly non-significant.

Implication. Attrition is high and differential. Period 3+ comparisons are confounded by selection. The periods 1–2 results are the most credible estimates of the causal effect. **D2 (heterogeneous fade-out) is not viable.** Any reframe of the paper must be grounded in periods 1–2.

D3 — Multiple outcomes: does behavioral HTE exist where SI-HTE does not?

What we did. We re-ran the GenericML BLP scanner (250 splits) for three behavioral outcomes at period 1, using the top 4 moderators from the main scanner:

Outcome	Construct	ATE	ATE p
`delta_si`	Scientific Intensity change (reference)	+0.60	< 0.001
`pivoting_any`	Any pivot made (binary)	+0.17	0.004
`sales_dummy`	Made a sale (binary)	−0.03	0.46
`dropout_program`	Left the program (binary)	*no valid splits*	

What we found. All HTE coefficients ($\hat{\beta}_2$) are null across all outcome × moderator combinations ($p > 0.17$ in all 12 cells). Notably:

- `pivoting_any`: the ATE is real and significant (+0.17, $p = 0.004$)—the training increases pivoting on average—but this effect is uniform across founder types.
- `sales_dummy`: no ATE and no HTE. The training does not affect sales in period 1.
- `dropout_program`: zero valid splits, suggesting near-zero variance in program dropout at period 1 (almost everyone still enrolled). Variable may be better defined at a later period.

Implication. **Ruta 1 (different Y) is not viable.** Behavioral translation of SDM learning is also uniform across observable founder types.

D4 — T&E vs Evidence-Based: does the theory component have differential fit?

What we did. We redefined the treatment as T&E (arm 1) vs. Evidence-Based (arm 2), excluding the control arm. The difference between these two arms is precisely the SDM theory component. We ran the full 12-moderator GenericML scanner (250 splits, periods 1 and 2).

What we found. ATE (T&E − EB) is near zero and non-significant at both periods (≈ -0.02 at P1, $+0.07$ at P2). All 24 HTE coefficients ($\hat{\beta}_2$) are null ($p > 0.15$ in all cells). The closest to signal is `exit_probability` at period 2 ($p = 0.148$), which does not meet any threshold.

Implication. T&E and Evidence-Based produce statistically indistinguishable outcomes on ΔSI, for all founder types. **Ruta 3 (theory-component HTE) is not viable.** The SDM framework does not differentially benefit any identifiable founder type relative to evidence-only training.

Synthesis: where we are.

Route	What it needed	Status	Evidence
0 — Original	Cognitive battery signal (Diego)	*Pending*	Awaiting 17 items
1 — Different Y	HTE on pivot / sales / dropout	Closed (D3)	All null
2 — Fade-out	Genuine fade-out (D1) + heterogeneous (D2)	Closed (D1)	Attrition artifact
3 — Theory fit	T&E vs EB HTE on any moderator	Closed (D4)	All null
4 — Methodological	What we already have	Open	RF ≠ DML; CLAN portrait

The paper has one open route before Diego: Ruta 4. The IoC finding (RF-predictive ≠ causally significant) combined with the CLAN portrait of the high-benefit founder is a clean methodological contribution to how we use ML for program targeting. It is publishable without the cognitive battery.

If Diego delivers the 17 items (risk aversion, uncertainty aversion, learning orientation, competitiveness), Ruta 0 reopens: these are the most theory-grounded moderators and the only untested family. A signal there makes this a complete foundations paper.

Scripts: `05_attrition_dynamics.do` (D1) · `06_genericml_d3_multiy.R` (D3) · `07_genericml_d4_te_vs_eb.R` (D4)
Data: `ERC_RED_HMC_clean.dta` (N = 6,732 obs, 6 sites, 3 arms) **Method:** Chernozhukov et al. (2025, *Econometrica* 93(4))
All results labeled EXPLORATORY.