

ARTICLE

THE ECONOMICS OF REPLICATION

*Why science's most necessary act has
become its least rewarded.*

THE UNSPOKEN PARADOX

Replication is the cornerstone of science and the orphan of funding. We claim that nothing is true until it can be reproduced, yet we have built a system in which replication is professionally suicidal. Journals reject it, funders ignore it, and institutions classify it as derivative rather than original. The consequence is structural: science now has a balance sheet without auditing.

Every other high-stakes industry – finance, aviation, manufacturing – builds redundancy into its safety culture. Science alone assumes honesty will substitute for verification. That assumption is collapsing under its own data.

HOW REPLICATION BECAME ECONOMICALLY INVISIBLE

Replication is invisible because it produces no novelty premium.

- **No “Impact” Multiplier.** Citation metrics and grant criteria emphasize discovery, not confirmation.
- **No Ownership Incentive.** Replicating another’s work creates no proprietary claim; intellectual property laws reward first movers.
- **No Administrative Fit.** Funding mechanisms require specific “innovation aims,” making replication formally ineligible.

Thus, a scientist who spends two years verifying a landmark result earns the same credit as one who did nothing – while the original paper, even if wrong, continues to accumulate prestige.

The message is unmistakable: replication is virtuous but irrational.

THE PRICE OF NON-VERIFICATION

The cost of neglect is quantifiable. Meta-analyses across psychology, oncology, and

preclinical biomedicine show replication rates below 50%. Entire therapeutic strategies have been built on unstable ground. The time lost to chasing false leads is measured not in dollars but in delayed cures and eroded trust.

When an unreplicated claim guides practice, it recruits patients into unintentional experiments. In that sense, the real ethics crisis in modern research is not consent but confirmation.

MAKING REPLICATION ECONOMICALLY RATIONAL

Replication will flourish only when it pays to be honest. Several levers can make it so:

- **Dedicated Replication Funds.** Allocate 10–15% of every major grant program to independent verification studies, using separate investigators.
- **Replication-Indexed Career Credit.** Promotion committees should count verified replication as a mark of mastery. It demonstrates judgment, not mimicry.
- **Dual-Publication Models.** Journals can pair original papers with pre-committed replication slots, ensuring that verification follows publication, not public outrage.
- **Reward Confirmed Negatives.** Funders can offer “truth bonuses” – small post-hoc grants for teams whose replications confirm or falsify major results transparently.

When integrity has a business model, replication stops being charity.

CASE STUDIES IN REFORM

The social sciences have already tested this. The Reproducibility Project and Registered Reports format have demonstrated that embedding replication into publication architecture raises overall reliability without stifling innovation. A similar model could easily be adapted to biomedicine – with independent labs verifying results before clinical translation.

Such embedded redundancy would raise the signal-to-noise ratio of the entire evidence base, lowering systemic waste. The ROI is moral and economic: less time correcting errors, more time extending truth.

MORAL ECONOMICS

The ultimate purpose of replication is not bureaucracy but humility. Science that does not question itself becomes ideology; replication is its conscience. We cannot preach evidence-based medicine while tolerating evidence-optional science. The cure is not new rhetoric about transparency – it is payment for proof.

Until we fund replication as seriously as we fund discovery, we will continue to mistake noise for knowledge and volume for validity. The economics of truth must balance.

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