Slow Science Manifesto

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The current structure of academic research, shaped by strong pressures on measurable productivity, is increasingly misaligned with the long-term goals of scientific progress. Tying career advancement and funding to quantitative publication metrics has introduced systemic distortions, favoring short-term outputs, fostering intense competition, and placing considerable strain on researchers. These dynamics risk undermining core values of science, including intellectual curiosity, open collaboration, and rigorous inquiry.

We thus demand a new *Slow Science* paradigm, advocating a realignment of research priorities toward practices that support depth and collaboration. Scientific progress depends not only on output volume, but on an ecosystem that enables sustained inquiry, diversity of thought, and long-term investment in knowledge.

The current situation

Global production of peer-reviewed articles in science and engineering rose from 2.0 million in 2010 to 3.3 million in 2022—a 65% increase over twelve years—with continued growth estimated at 4% annually [1]. While broader participation in research is a positive development, concerns have been raised that scientific progress is becoming more incremental, with fewer major conceptual advances and greater specialization [2–4]. This expansion also imposes increasing burdens on researchers and the academic infrastructure:

- **Working conditions.** Many researchers face high workloads, job insecurity, and a lack of clear career paths. Fixed-term contracts, long working hours, and pressure to produce rapid outputs contribute to burnout and impact work-life balance [5–9]. These conditions are increasingly seen as systemic rather than exceptional.

- **Competition over collaboration** Scientific progress relies on open exchange and cooperation. However, current evaluation systems often reward individual performance metrics, which can discourage collaboration across labs, institutions, and disciplines. Excessive emphasis on individual productivity scores has been shown to reduce collaboration and promote secrecy, as scientists worry about losing recognition and may hesitate to share data, methods, or materials [10]. Moreover, evidence suggests that hyper-competitive, high-output environments may also increase scientific bias [11].

- **Research integrity.** Intense publication pressure contributes to questionable research practices. Negative results are underreported, methodological transparency is sometimes compromised, and bibliometric incentives can lead to excessive self-citation or strategic authorship practices [11–15]. These trends raise concerns about reproducibility and quality control. Moreover, the increasing volume of submissions increases the workload on reviewers, who must often produce assessments rapidly, with fewer opportunities for constructive rebuttal. This contributes to a deterioration in the quality of peer review and creates a negative feedback loop.

- **Intellectual fragmentation.** The increasing volume of scientific output makes it difficult to maintain awareness beyond narrow subfields. Time for deep reading, reflection, and learning new areas is limited. As a result, research communities may become siloed, and valuable insights risk being overlooked or periodically rediscovered.

- **Equity and inclusion.** Structural pressures within academia disproportionately affect individuals with caregiving responsibilities, health conditions, or limited institutional support, creating a systemic bias against scholars from under-resourced institutions or countries. Women, in particular, remain underrepresented in senior roles, partly due to persistent disparities in time availability and support structures [16, 17]. They leave academia at significantly higher rates throughout the entire career span, not only at early stages, contributing substantially to long-term gaps in senior representation [18].

- **Undervalued academic contributions.** Activities such as teaching, peer review, mentoring, and public engagement are essential to the scientific enterprise, yet they are often under-recognized, if not ignored, in hiring and promotion criteria [19]. Moreover, practices that make scientific research more accessible and useful, such as data sharing and ensuring reproducible results [20], are typically not taken into account. The academic reward system remains heavily skewed toward publication volume, overlooking important dimensions of research quality for which no automated metrics exist [21].

The case of AI: Structural challenges in a fast-moving field

The field of Artificial Intelligence (AI) illustrates how systemic research challenges can be amplified in fast-paced, well-funded domains. Rapid technological advances and widespread interest have created intense competition for visibility and resources, drawing researchers from many disciplines.

AI's dominant conference model, with fixed deadlines and high submission volumes, encourages a rapid publication cycle. This can limit the scope for foundational or high-risk research and reinforce focus on popular tools and datasets. The review process, under pressure from volume and timelines, favors incremental contributions and discourages deviation from prevailing trends.

Furthermore, unequal access to computational resources exacerbates disparities across institutions. Large-scale experiments may be feasible only for researchers at well-funded organizations, limiting participation and diversity of approaches. In combination, these factors create an environment where short-term outputs are prioritized, and exploratory or critical work is undervalued.

How did we get here?

- **Resource concentration.** Competitive funding schemes such as the ERC or national equivalents often concentrate support among a small number of recipients. Selection procedures, though peer-reviewed, are highly selective and can favor established networks or topics. Preparation of proposals requires substantial time investment, and outcomes may depend in part on reviewer alignment or limited information. The resulting disparities in access to funding have persistent effects on career development and research capacity. Furthermore, given the significant time investment required to prepare proposals, researchers may spend disproportionate effort applying for grants compared with the time ultimately devoted to the funded work.
- **Quantitative evaluation.** Hiring and promotion processes increasingly rely on publication metrics, such as h-index or journal impact factors. In some systems, rigid thresholds are applied without adequate consideration of field-specific norms, career breaks, or collaborative contexts [22]. This can disadvantage researchers working in less visible domains or those with non-linear career trajectories. All these factors should be considered to normalize publication volumes (e.g., number of publications or citations) and enable fair compar-

ison between candidates [23, 24]. For instance, the practice of using journal impact factors as a proxy for research quality is problematic: as citation distributions within journals are highly skewed, a small fraction of papers accounts for the majority of citations, making the metric a poor indicator for the value of any individual article [25–27].

- **AI-enabled production.** Tools for automated writing, coding, and data analysis have made it easier to generate and revise manuscripts. While such tools can enhance productivity, they also risk increasing the volume of marginal contributions, making it more difficult to identify significant advances. Their use in peer review also raises new concerns about evaluation, quality and accountability [14].
- **Chronic underfunding.** In many countries, chronic underinvestment in public research has created an environment of structural precarity. Scarcity of permanent positions and competitive grant systems contribute to instability and limit researchers' ability to pursue deeply creative or exploratory projects.

Our appeal

Scientific research operates within a complex system of incentives, expectations, and constraints. Transformative reform will eventually be carried out by the institutions, to whom we reserve our strongest appeal, but we believe that each member of the community can concretely act towards a healthier research environment. We close this manifesto with an appeal to both institutions and researchers, committing to directing our future actions toward achieving these goals.

Call to institutions

- **From funders:** Adopt diversified funding models that support a broad base of researchers. Reduce reliance on winner-takes-all schemes in favor of mechanisms that enable exploratory research by multiple teams.
- **From research institutions:** Broaden evaluation criteria to recognize mentoring, teaching, open science practices, and service to the academic community. Avoid equating merit with bibliometric indicators through an over-reliance on monodimensional metrics.
- **From publishers:** Promote high-quality slow review processes, encourage publication of negative results and replication studies, and decouple business models from volume-based

incentives. In this framework, open access is essential: all papers, code, and data must be public at publication. The extent to which AI tools are used to perform reviews or write articles must be assessed.

Call to researchers

Cultural change cannot be achieved by individuals acting in isolation. Shifting the norms of academic research requires coordinated effort, shared responsibility, and mutual support. Those who subscribe to the ideals of Slow Science commit not only to rethinking their own practices, but also to contributing to a broader network that makes such change possible. To shift the academic equilibrium toward healthier, more sustainable practices, we need a collective commitment to reordering values and expectations.

- Support a culture of collaboration, transparency, and constructive critique. Recognize that scientific progress depends not only on novel results but also on careful validation, methodological clarity, and openness to diverse perspectives.
- Resist the pressure to pursue incremental studies solely for the sake of measurable output. Allocate resources and expertise to projects that contribute to the collective progress of the field.
- Respect professional and personal boundaries. Do not expect immediate responses outside of reasonable working hours, and refrain from imposing expectations on weekend and overtime work on students and junior collaborators.

We recognize that such kind of behavior can jeopardize a research career in the current system. Therefore, we call on those with secure positions—senior and tenured scientists, lab leaders—to lead the way. Nonetheless, researchers at all levels must adhere to work standards aimed at strengthening the conditions for thoughtful, inclusive, and rigorous inquiry. Together, we can support a healthier research culture and ensure that science continues to serve society effectively. Together, we can redefine what it means to be a scientist.

References

[1] National Science Board, National Science Foundation. "Discovery: R&D Activity and Research Publications". In: *Science and Engineering Indicators* (2025). Chapter "Publication Output by Geography and Scientific Field".

[2] T. T. Hills. "The Dark Side of Information Proliferation". In: *Perspectives on Psychological Science* 14.3 (2019), pp. 323–330.

[3] Ø. Paasche and H. Österblom. "Unsustainable Science". In: *One Earth* 1.1 (Sept. 2019). Commentary, pp. 40–42.

[4] M. Park, E. Leahey, and R. J. Funk. "Papers and Patents Are Becoming Less Disruptive over Time". In: *Nature* 613.7942 (2023), pp. 138–144.

[5] OECD. "Reducing the precarity of academic research careers". In: *OECD Science, Technology and Industry Policy Papers* 113 (2021).

[6] S. Milojević, F. Radicchi, and J. P. Walsh. "Changing demographics of scientific careers: The rise of the temporary workforce". In: *Proceedings of the National Academy of Sciences* 115.50 (2018), pp. 12616–12623.

[7] A. K. Stage. "Are national university systems becoming more alike? Long-term developments in staff composition across five countries". In: *Policy Reviews in Higher Education* 4.1 (2020), pp. 68–104.

[8] D. J. Madigan and T. Curran. "Does Burnout Affect Academic Achievement? A Meta-Analysis of over 100,000 Students". In: *Educational Psychology Review* 33.2 (June 2021), pp. 387–405.

[9] H. Cadena-Povea et al. "What Pushes University Professors to Burnout? A Systematic Review of Sociodemographic and Psychosocial Determinants". In: *International Journal of Environmental Research and Public Health* 22.8 (2025).

[10] F. C. Fang and A. Casadevall. "Competitive Science: Is Competition Ruining Science?" In: *Infection and Immunity* 83.4 (2015), pp. 1229–1233.

[11] D. Fanelli. "Do Pressures to Publish Increase Scientists' Bias? An Empirical Support from US States Data". In: *PLOS ONE* 5.4 (Apr. 2010), pp. 1–7.

[12] A. Baccini, G. De Nicolao, and E. Petrovich. "Citation gaming induced by bibliometric evaluation: A country-level comparative analysis". In: *PLOS ONE* 14.9 (Sept. 2019), pp. 1–16.

[13] M. Biagioli and A. Lippman. *Gaming the Metrics: Misconduct and Manipulation in Academic Research*. The MIT Press, Jan. 2020.

[14] E. Gibney. "Scientists hide messages in papers to game AI peer review". In: *Nature* 643.8073 (2025), pp. 887–888.

[15] M. A. Edwards and S. Roy. "Academic Research in the 21st Century: Maintaining Scientific Integrity in a Climate of Perverse Incentives and Hypercompetition". In: *Environmental Engineering Science* 34.1 (Jan. 2017), pp. 51–61.

[16] H. Shen. "Inequality quantified: Mind the gender gap". In: *Nature* 495.7439 (Mar. 2013), pp. 22–24.

[17] M. Goulden, K. Frasch, and M. A. Mason. *Staying Competitive: Patching America's Leaky Pipeline in the Sciences*. Tech. rep. Center for American Progress and Berkeley Center on Health, Economic & Family Security, University of California, Berkeley, Nov. 2009.

[18] J. Huang et al. "Historical comparison of gender inequality in scientific careers across countries and disciplines". In: *Proceedings of the National Academy of Sciences* 117.9 (2020), pp. 4609–4616.

[19] E. C. McKiernan. "Imagining the "open" university: Sharing scholarship to improve research and education". In: *PLOS Biology* 15.10 (Oct. 2017), e1002614.

[20] A.-W. Chan et al. "Increasing value and reducing waste: addressing inaccessible research". In: *The Lancet* 383.9913 (2014), pp. 257–266.

[21] D. Moher et al. "Assessing scientists for hiring, promotion, and tenure". In: *PLOS Biology* 16.3 (Mar. 2018), pp. 1–20.

[22] A. Abbott et al. "Metrics: Do metrics matter?" In: *Nature* 465.7300 (June 2010), pp. 860–862.

[23] "San Francisco Declaration on Research Assessment (DORA)". 2013.

[24] D. Hicks et al. "Bibliometrics: The Leiden Manifesto for research metrics". In: *Nature* 520.7548 (Apr. 2015), pp. 429–431.

[25] P. O. Seglen. "Why the impact factor of journals should not be used for evaluating research". In: *BMJ* 314.7079 (1997), p. 497.

[26] "Not-so-deep impact". In: *Nature* 435.7045 (June 2005), pp. 1003–1004.

[27] R. Adler, J. Ewing, and P. Taylor. "Citation Statistics". In: *Statistical Science* 24.1 (Feb. 2009).