The Motivation Dip: Investigating Post-Award Risk Aversion in Scientific Trajectories

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Scientific recognition; Intellectual risk-taking; Motivation crowding; Behavioral economics; Topic novelty; Scientometrics; Research conservatism; Extrinsic incentives; Longitudinal analysis

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Introduction

Scientific progress depends on a balance between established knowledge and bold exploration. While recognition through prestigious awards often signals exceptional contributions, it may also influence the trajectory of future work in ways not fully understood. Existing behavioral theories suggest that extrinsic rewards can sometimes undermine intrinsic motivation, potentially leading individuals to engage in safer, more conservative behavior to protect their newly acquired status. This phenomenon — known as *motivation crowding* — raises critical questions in the context of scientific research: do prize-winning scientists become less willing to take intellectual risks after being recognized?

This project explores the possibility of a *motivation dip* following major scientific awards. Specifically, we investigate whether highly recognized scientists exhibit measurable declines in research novelty, topic diversity, and risk tolerance after receiving a major prize. While such awards confer prestige, resources, and broader influence, they may also create reputational stakes that discourage deviation from proven research lines. Alternatively, awards may reinforce intellectual independence and support continued innovation. This research empirically tests these competing hypotheses by analyzing longitudinal patterns in scientific output before and after award events.

By combining approaches from behavioral economics, motivational psychology, and scientometrics, this study contributes to an emerging body of work examining how institutional incentives shape the conduct of science. Rather than treating recognition as a mere endpoint of productivity, we analyze it as a *turning point* that may recalibrate how scientists choose problems, frame questions, and engage with intellectual risk.

The broader goal is to understand how scientific institutions can design recognition systems that not only reward past achievement, but also sustain — or even enhance — bold thinking and exploratory research among those at the top of their fields.

Methods

Sample Selection and Award Tracking

The dataset comprises a panel of internationally recognized scientists who have received major scientific awards between 1990 and 2015. The selection includes laureates of the Nobel Prize, Fields Medal, Breakthrough Prize, Turing Award, Lasker Award, and comparable disciplinary honors across the natural sciences, mathematics, and computer science. For each recipient, we compile a longitudinal publication record spanning 10 years before and 10 years after the award, enabling the assessment of pre- and post-recognition trajectories.

For comparison, we construct a matched control group of scientists who did not receive the award but are similar in field, career stage, institutional prestige, and pre-award publication metrics. Matching is performed using a propensity score approach that accounts for cumulative citations, h-index, publication volume, and centrality in coauthorship networks. This allows for causal inference regarding the effect of receiving an award on subsequent research behavior.

Each publication is annotated with metadata including title, abstract, publication date, journal, coauthors, citation count, and field classification. Author disambiguation is performed using persistent identifiers (e.g., ORCID, Scopus ID) and cross-database matching.

Measuring Risk-Taking and Research Conservatism

To quantify intellectual risk-taking, we develop three primary metrics:

1. **Topic Novelty**: Measured using vector-based embeddings of paper abstracts (via models like SPECTER or SciBERT), we assess how semantically distant a new publication is from the author's previous work. A greater average cosine distance indicates higher topic divergence. We also calculate "burstiness" — the rate at which an author introduces previously unused keywords or topic clusters — to capture thematic expansion.
2. **Citation Diversity**: This metric captures the heterogeneity of sources cited within a paper. Using normalized entropy scores over cited journal fields and institutional affiliations, we identify whether post-award publications rely on narrower, more insular literatures or maintain diverse intellectual inputs. A decline in citation diversity suggests consolidation around established research areas.
3. **Collaborator Novelty**: Calculated as the proportion of new coauthors introduced relative to the author's existing collaboration network. High collaborator novelty is associated with interdisciplinary and exploratory research ventures, while low novelty indicates conservatism in research partnerships.

These metrics are computed annually for each scientist in the sample, forming a temporal profile of research risk indicators.

Statistical Modeling and Hypothesis Testing

We employ **difference-in-differences (DiD)** regression models to test whether recognized scientists show significant post-award changes in novelty, citation diversity, and collaboration compared to matched controls. Fixed effects account for individual and temporal heterogeneity,

while interaction terms model whether the award has heterogeneous effects across disciplines, gender, or career stage.

We also test for non-linear trajectories by applying piecewise regression to detect inflection points and estimate the *duration* of any motivation dip. In exploratory models, we include media attention scores and funding data (when available) as moderating variables, to examine whether public visibility or resource increases influence post-award conservatism.

Robustness checks include placebo tests with "fake" award dates assigned to control scientists, permutation tests, and subgroup analyses by prize type. All analyses are implemented in reproducible Python and R workflows, with code and anonymized data shared via open-access repositories.

Potential Impact

This project offers a novel empirical contribution to the study of how recognition systems influence scientific behavior. By tracing measurable changes in risk-taking following prestigious awards, we challenge the assumption that recognition necessarily fuels continued innovation. The discovery of a *motivation dip* — a decline in exploratory research following external reward — would have significant implications for the design of academic incentive structures, tenure systems, and prize institutions.

Theoretically, the study extends behavioral economics models of motivation crowding into the domain of scientific creativity, offering new insights into the psychological and strategic dynamics of high-prestige academic careers. It also informs the psychology of goal-setting, showing how achievement thresholds may recalibrate perceived risk and motivation.

Practically, our findings may guide funding agencies and award committees in structuring post-award support to encourage continued boldness. For example, combining recognition with explicit mandates for exploration or collaborative experimentation may help mitigate conservatism. Institutions might also consider staggered or phased awards that reinforce ongoing innovation rather than signaling a career peak.

Moreover, this work contributes to a broader critical reevaluation of academic reward systems, suggesting that symbolic capital, while essential to scientific legitimacy, must be carefully calibrated to avoid inadvertently suppressing the very risk-taking behaviors that drive progress.

By treating recognition not as an endpoint, but as an inflection point in scientific lives, this research opens space for a more dynamic and human-centered understanding of how excellence is rewarded — and how it shapes what comes next.