How AI Reshapes Human Content Creation: The Case of Wikipedia

Evidence from the Introduction of Grokipedia

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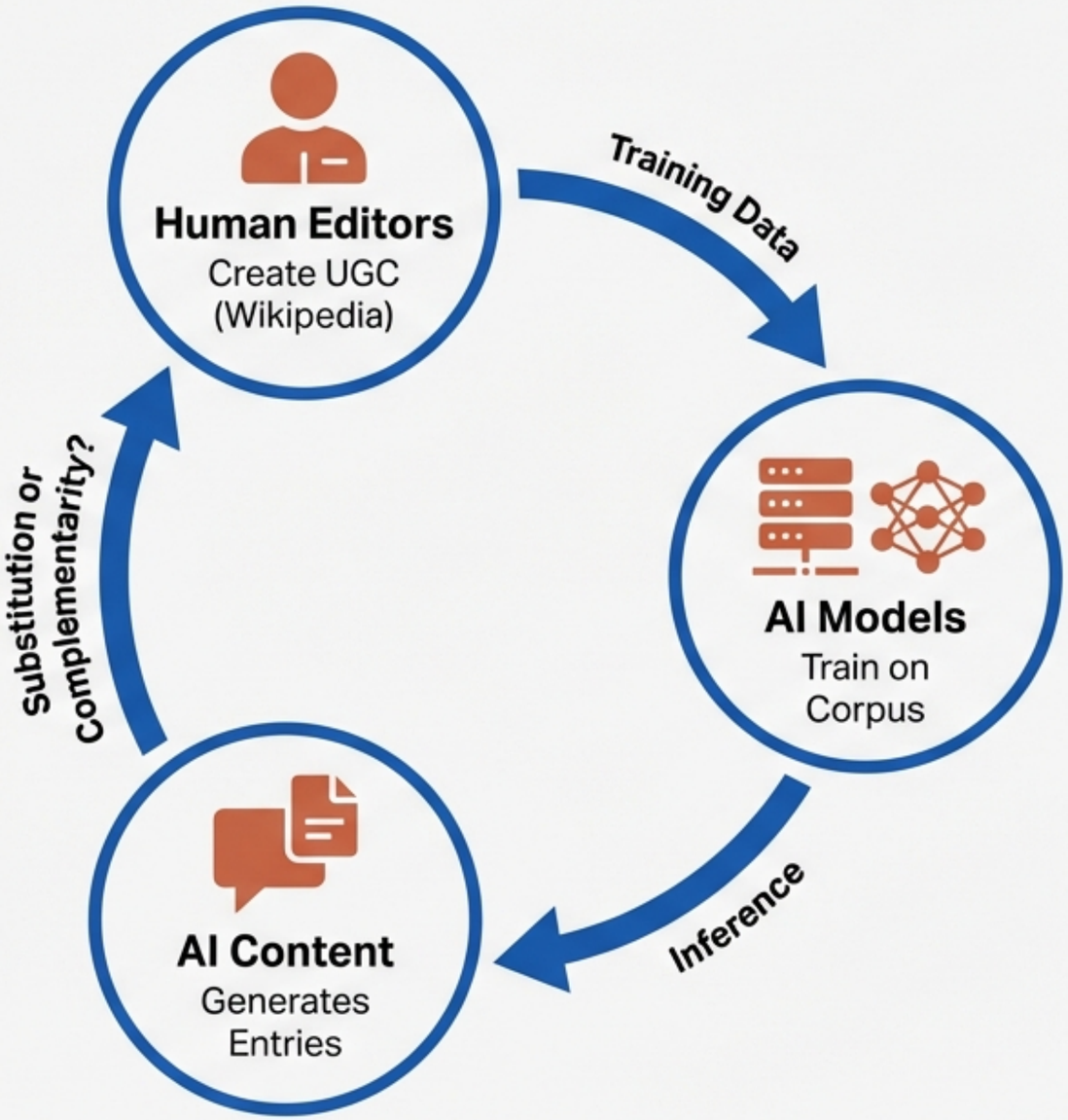
January 2026

Does Generative AI crowd out the voluntary human contributions that sustain it?



The "Data Ouroboros": A Feedback Loop at Risk

The Economic Puzzle:

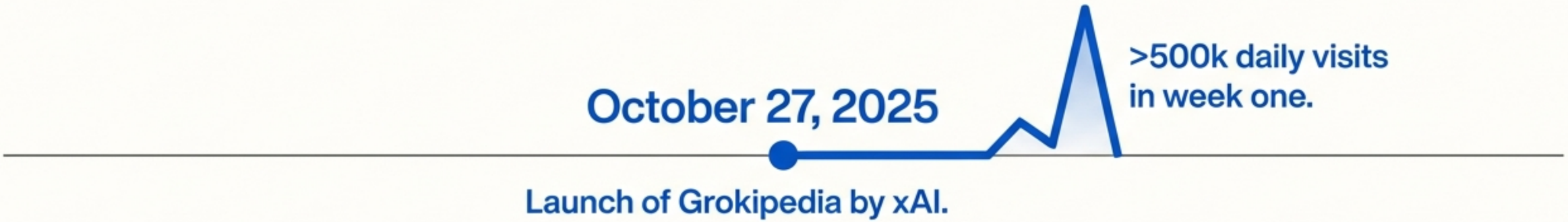
Generative AI relies on "vast amounts of UGC" (Dodge et al., 2021). Wikipedia is a core training source. If AI AI output replaces human consumption, does it destroy the incentives to create the training data?

Two Competing Hypotheses

1. **The Substitution Hypothesis (Crowd-out):** AI reduces the marginal value of human contribution. Traffic drops, motivation fades.
2. **The Complementarity Hypothesis (Crowd-in):** AI lowers search costs, highlights information gaps, or acts as a gateway.

> "If AI-generated content discourages human contributors, the long-run sustainability of the data ecosystem… may be undermined."

The Exogenous Shock: Enter Grokipedia



The Product

Grokipedia is an AI-generated encyclopedia integrated integrated with the Grok chatbot. It ingests Wikipedia content but rewrites and curates it to offer a "faster-moving, AI-supported alternative."

The Natural Experiment

- Universe: 1.4 million notable individuals on Wikipedia (Academia, Culture, Leaders, Politics, Sports).
- Treatment Group (Cobalt Blue text): ~170,000 pages (12%) receive a Grokipedia entry.
- Control Group (Terracotta text): ~88% do not.
- Note: Assignment is not random; it favors popular pages.

Theoretical Ambiguity: Substitution vs. Amplification

Model of Attention (Page Views)

$$Views_i = \bar{V}_i + G_i(\theta - \delta s_i)$$

Amplification Parameter. The "Gateway Effect" where AI drives traffic to the source.

Similarity. How identical the AI is to the human text.

Substitution Parameter. Traffic theft based on content overlap.

Model of Incentives (Edits)

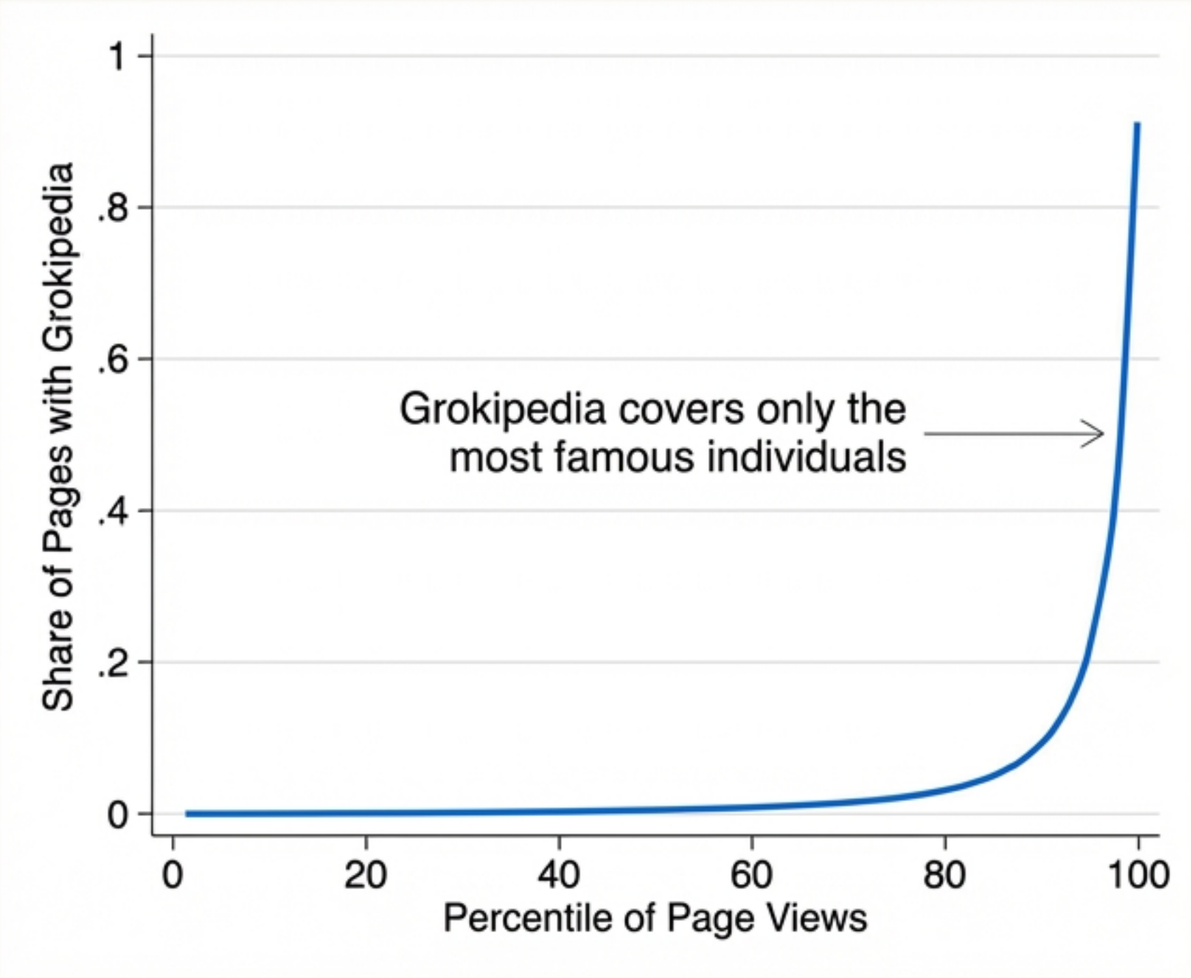
$$Benefit_i = \kappa \cdot Views_i + G_i \cdot \rho(1 - s_i)$$

Pro-social Motivation. More eyeballs = higher incentive to edit (Linus's Law).

Inspiration Channel. Novelty $(1 - s_i)$ triggers "corrective" or "expansion" motives.

> Prediction: The net effect is ambiguous. If Amplification (θ) and Inspiration (ρ) dominate Substitution (δ), AI will increase human editing.

The Selection Problem: The '90th Percentile' Bias

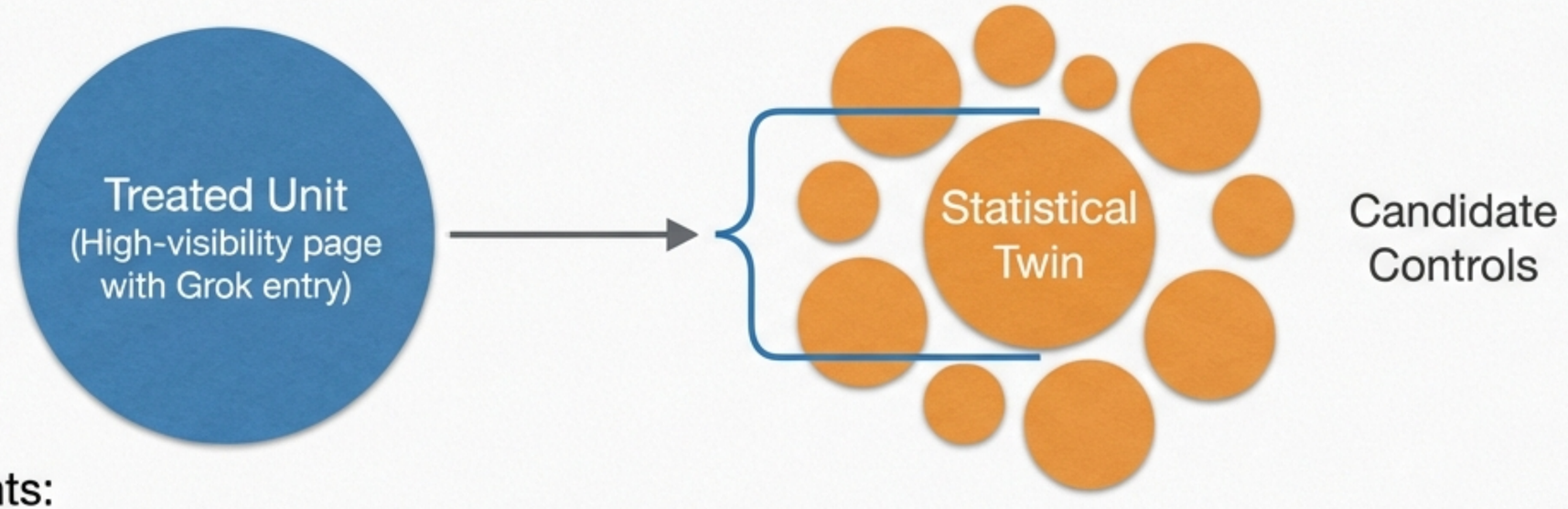


The Identification Challenge:

- Grokipedia coverage is virtually zero for the bottom 80% of Wikipedia pages.
- Probability spikes to >90% for the top 5% of pages.
- Naive comparisons are biased: High-traffic pages behave differently than low-traffic pages regardless of AI.
- Regression Evidence: $ln(Views)$ alone explains ~48% of the variation in selection.

Conclusion: We cannot simply compare Treated vs. Untreated means. We need a matched counterfactual.

Identification Strategy: Mahalanobis Matching

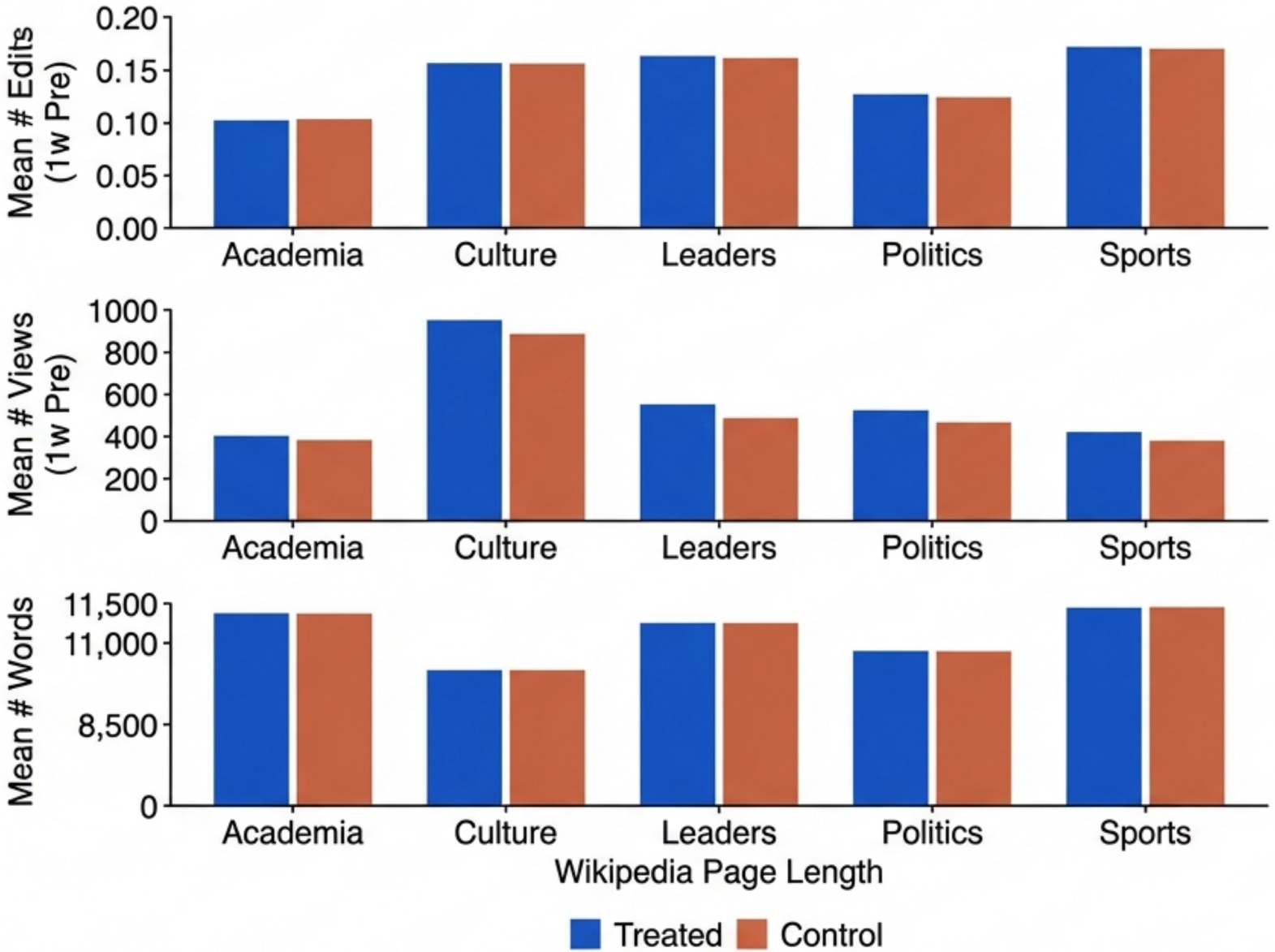


Matching Ingredients:

1. Exact Matching on Field: Academics matched only to Academics.
2. Mahalanobis Distance Metric minimizing differences in:
   - Pre-trend Views (1, 2, 3 weeks prior)
   - Pre-trend Edits (1, 2, 3 weeks prior)
   - Long-run readership (2015-2018)
   - Page length (word count)

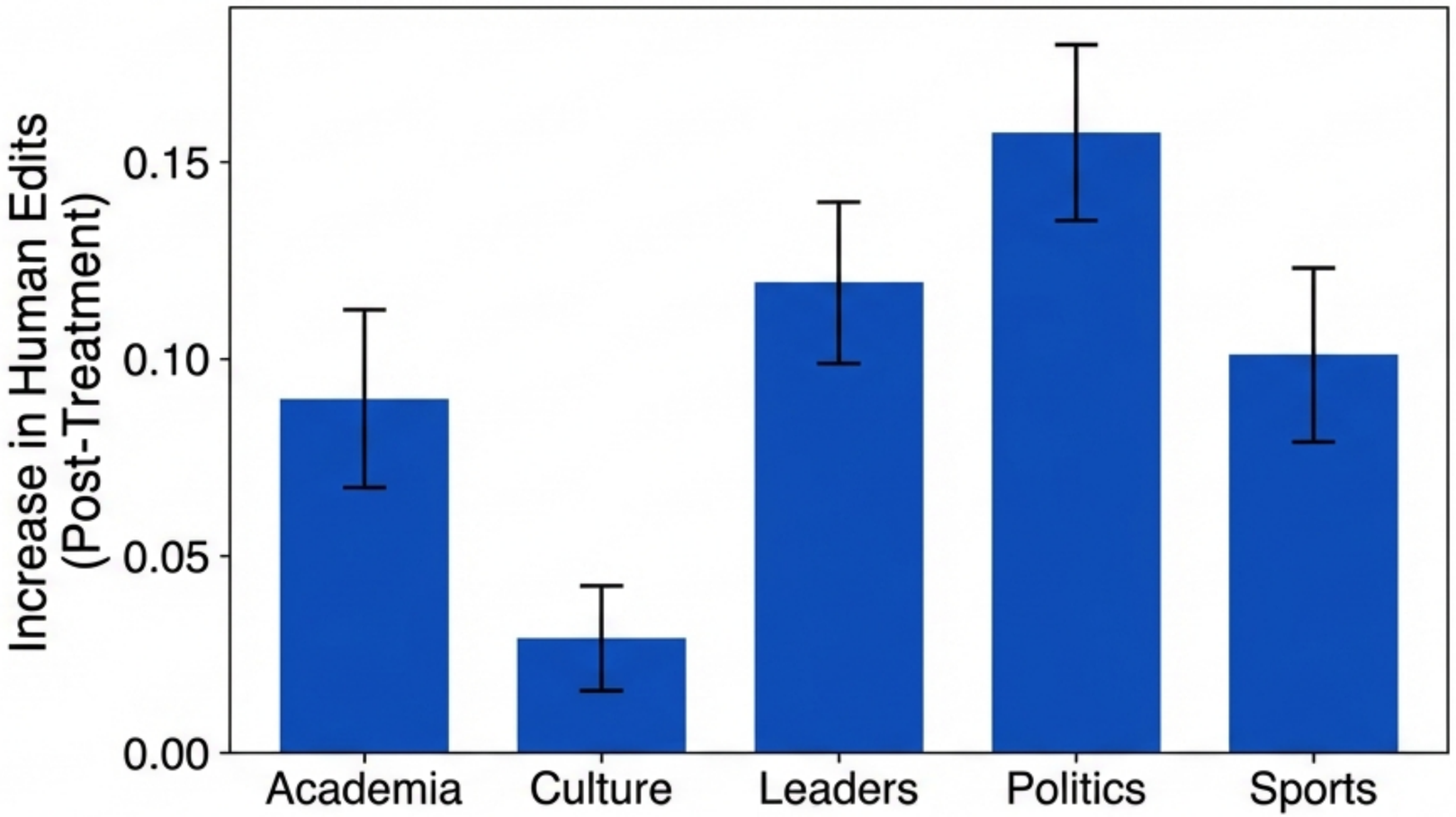
Sample Construction: 174,771 treated pages → 138,989 matched pairs.
Method: Difference-in-Differences (DiD) estimation on the matched sample.

Proof of Validity: Balance and Parallel Pre-Trends



Result: The matching procedure successfully balances observable characteristics. Control pages accurately approximate the counterfactual trajectory.

The Main Effect: AI Complements Human Effort

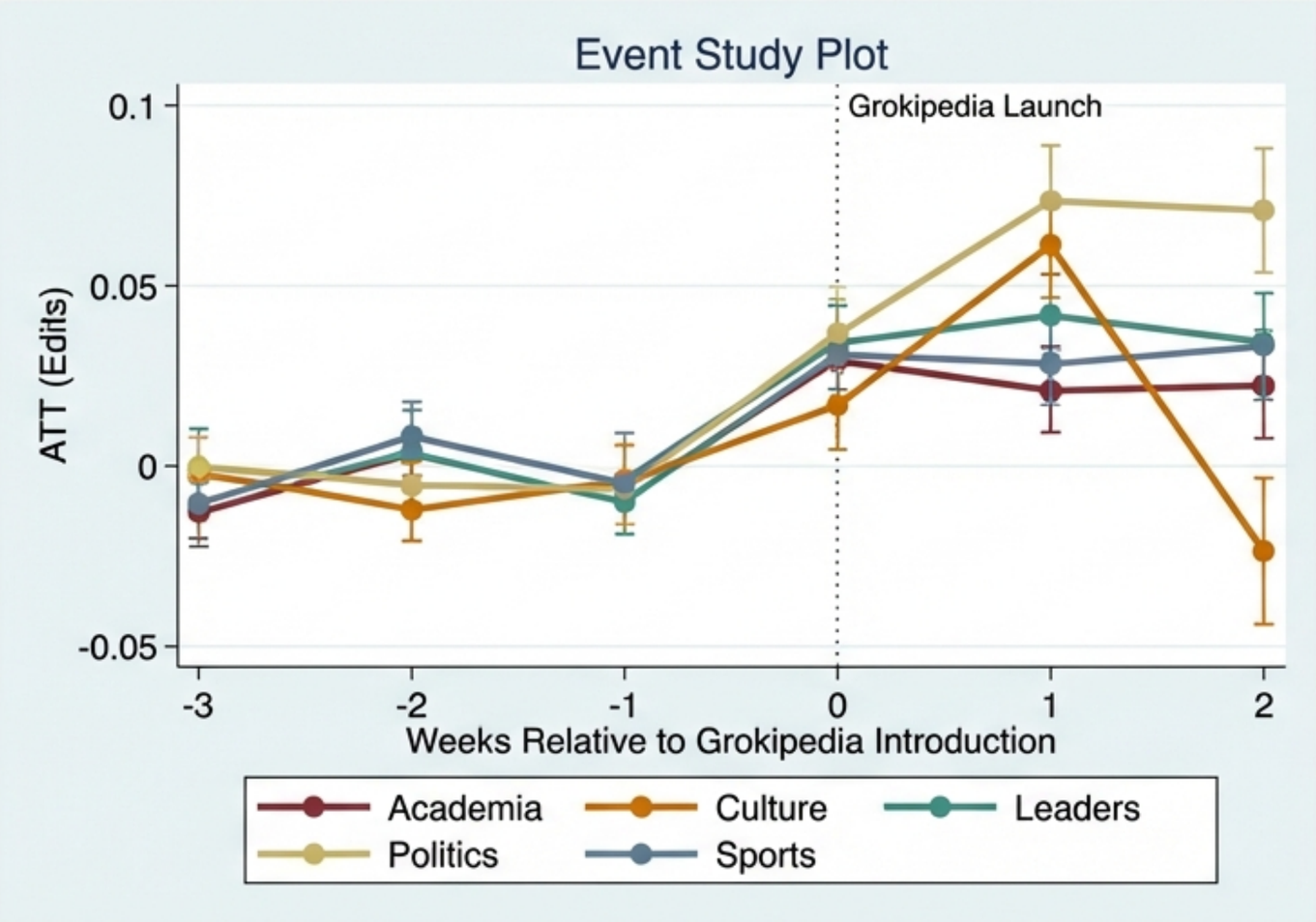


Magnitudes

Rejection of Crowd-out: Grokipedia significantly increases human editing activity.

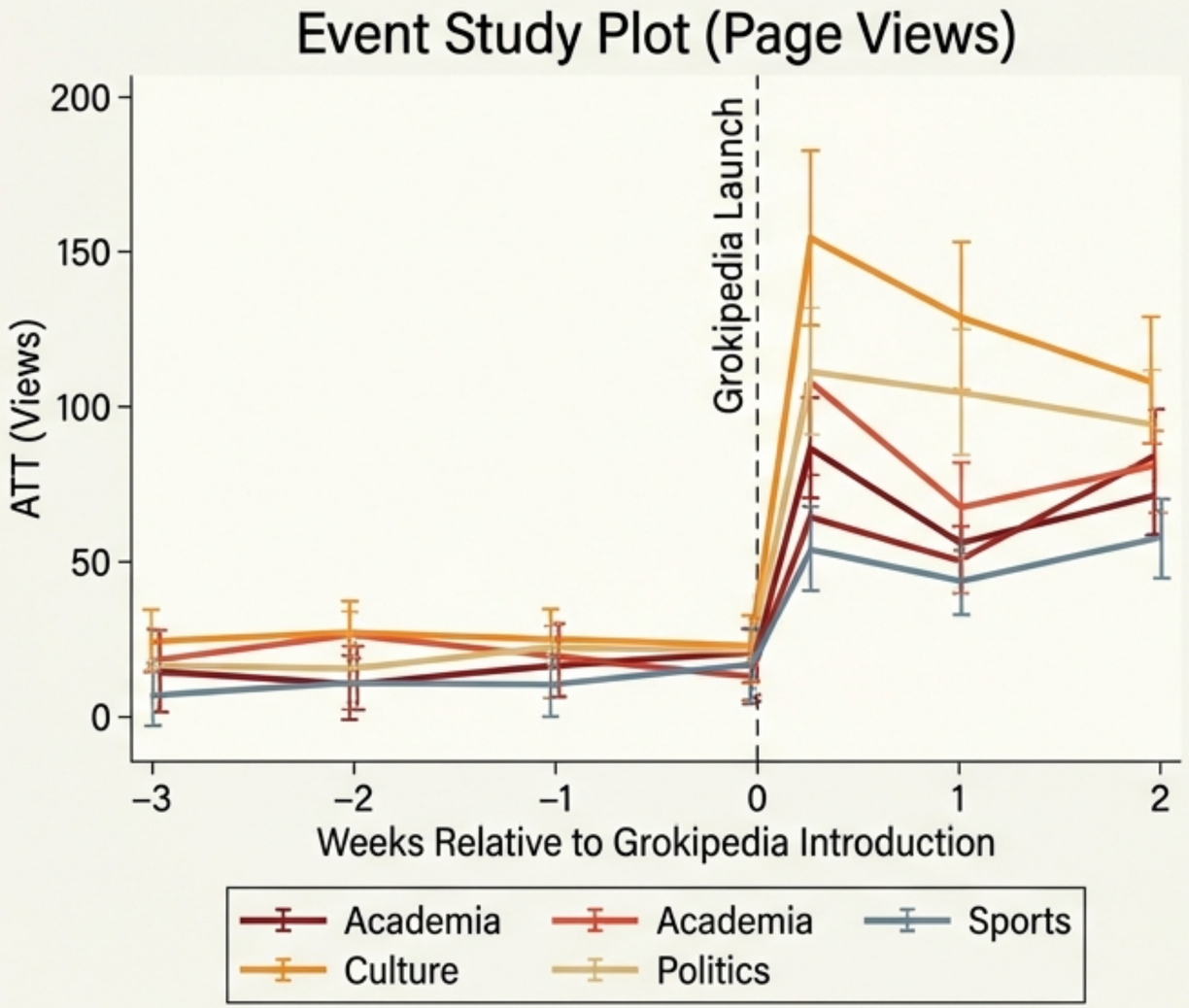
- **Politics:** >100% increase relative to pre-period mean.
- **Academia:** +80% increase relative to pre-period mean.
- Also observing significant increases in Page Views (+20-30%).

Dynamic Effects: Immediate and Persistent Response



1. Validity: Flat pre-trends confirm no anticipatory effects.
2. Shock: Immediate positive jump at Week 0 across all fields.
3. Persistence: Effects remain stable or grow (except Culture), ruling out a momentary ‘novelty spike’.

Mechanism 1: The Attention Gateway



Finding:
Treated pages see ~10-30% more traffic than matched controls immediately upon Grokipedia launch.

Interpretation: The 'Gateway Effect'.
Users verify AI claims by clicking through to the source (Wikipedia). This validates the Amplification Parameter ($\theta > \delta$).

Connection to Edits:
More eyeballs = higher probability of spotting errors = more edits (Linus's Law).

Mechanism 2: The Inspiration Channel

Case Study: The 'Trump' Entry (Oct 27, 2025)

Grokipedia Entry

…Fred Trump's **pragmatic engagement with local political machines** for development approvals… direct anti-communist transmission remains less documented…

Wikipedia Edit (3 Days Later)

Added Category: **American Anti-Communists**

Refined content mirroring the Grok framing regarding political engagement.

Theory: AI lowers the cognitive cost of identifying gaps.

- 👉 **High Similarity:** AI is a clone → User learns nothing → No Edit.
- 👉 **Low Similarity:** AI frames topic differently → User spots gap → Edit Triggered.

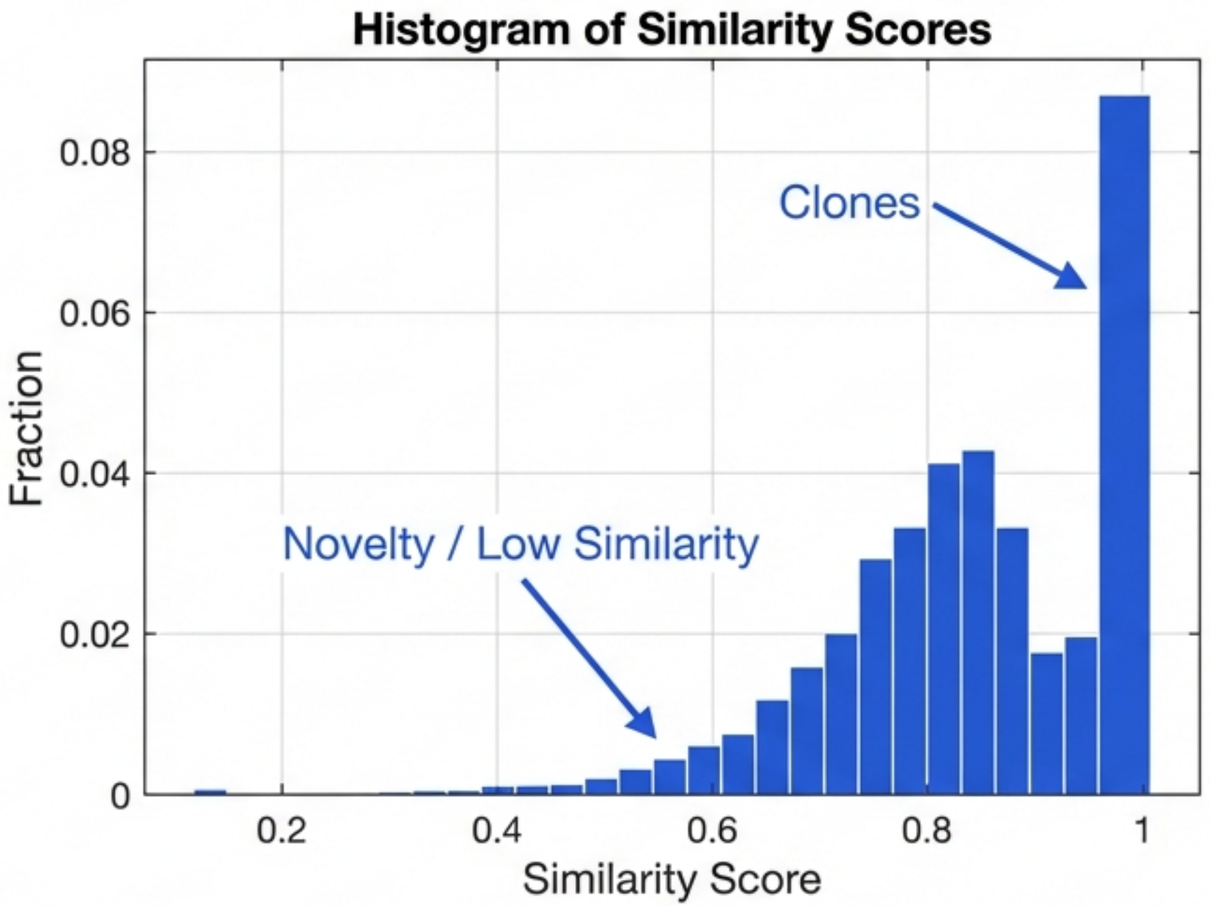
Prediction: If this channel is real, editing should be higher on pages where Grokipedia is *different*.

Measuring the ‘Gap’: Semantic Similarity

Methodology Text.

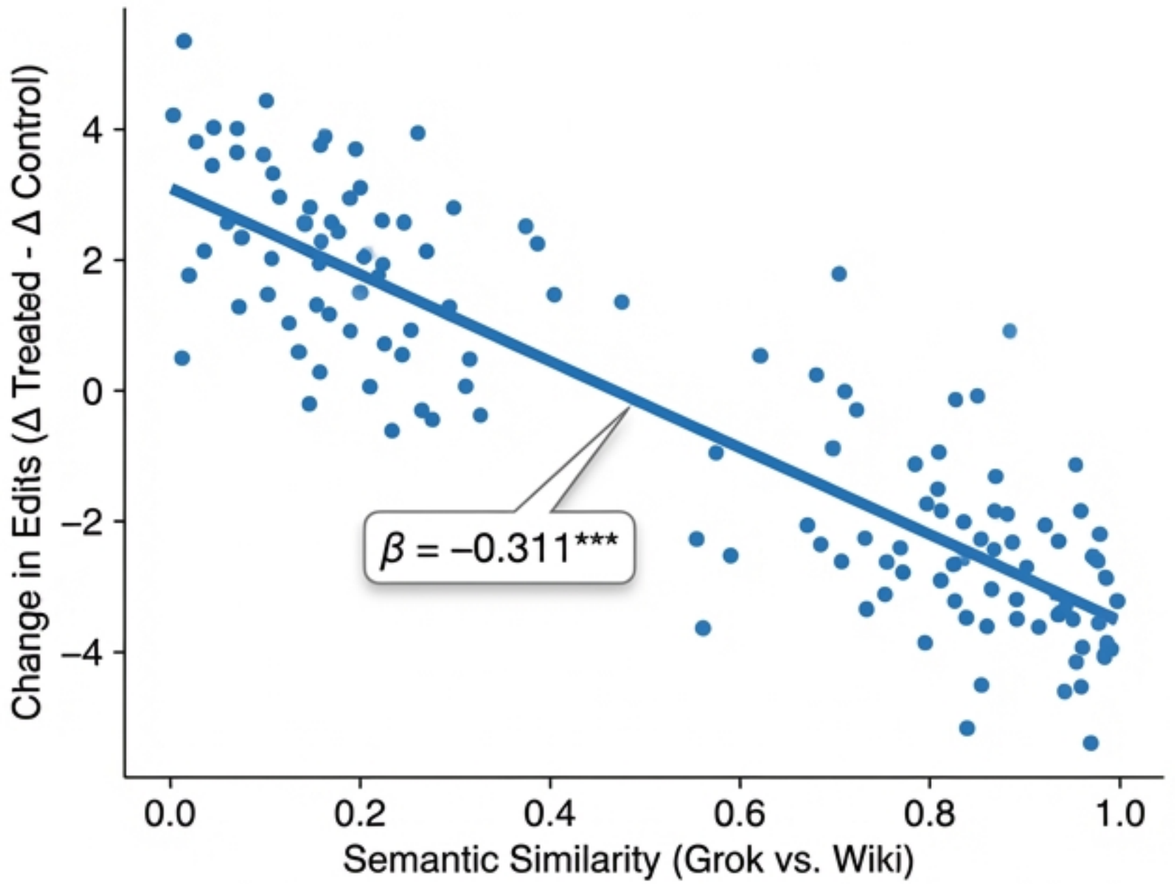
We measure the overlap between Grokipedia and Wikipedia using a hybrid metric:

1. Sentence Embeddings (all-MiniLM-L6-v2): Captures conceptual meaning (Weight 0.6).
2. TF-IDF: Captures lexical/word overlap (Weight 0.4).



The Similarity Gradient: Novelty Drives Edits

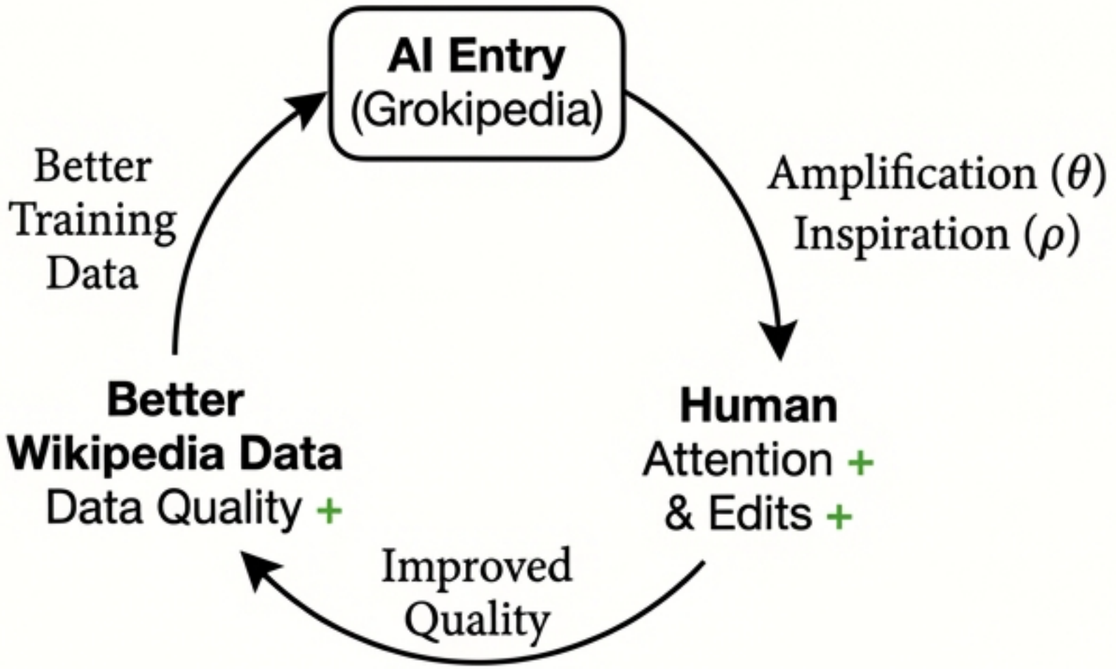
****Higher Edits****
When AI presents a different view, humans intervene to 'correct the record' or 'bridge the gap'.



****Lower Edits****
When AI is a clone, humans have no incentive to act.

Validates the Inspiration Channel: Humans aren't just editing because of traffic; they are responding to the content itself.

The Recombinant Feedback Loop



The Verdict: AI Tools complement—rather than crowd out—voluntary human contributions.

Mechanism: A “Flight to Quality.” Humans reassert jurisdiction over the truth when challenged by an AI competitor.

Conclusion & Implications

- **Complementarity, Not Substitution**
  Using a matched Difference-in-Differences design, we find that the introduction of Grokipedia increased Wikipedia edits by >50% and views by >20%.
- **Mechanisms: Amplification and Novelty**
  The effect is driven by the 'Gateway Effect' (traffic referral) and the 'Inspiration Effect' (novel framing triggers corrective editing).
- **The Future of Public Goods**
  In a non-monetary setting, AI competition spurs a 'Guardianship' motive. AI acts as a recombinant tool that lowers the cost of discovering knowledge gaps.

The data ecosystem is resilient. Competition for attention spurs the private provision of the public good.