From Publishing Models to Cognitive Network: How Blockchain and AI Redefines Academic System

by
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Finally, this work is dedicated to my family: my father Lingfeng Wang, my mother Weihong Zhang, and my grandmother. Your company across oceans gave me the privilege to pursue this path.

1.Abstract

This paper aims to analyze technological, economic, ethical, and political dimensions by designing multiple future scenarios and applying backcasting for pathway analysis, thereby Mapping a blockchain and AI-driven academic ecosystem over the next 20 to 200 years. It fills a research gap in the integrated theoretical framework, power evolution studies, and ethical research related to their coexistence.

The primary scenarios are divided into two: power transition (2030-2050) and technological transformation (2030-2200).

The first scenario is set against a backdrop in which traditional publishers' restrictions on knowledge dissemination triggered the Open Access movement. However, publishers soon capitalized on the movement by imposing high APCs, resulting in a new form of centralized monopoly. This cycle reveals persistent structural power imbalances. The emergence of blockchain and artificial intelligence brings renewed hope. These technologies are seen as potential tools to disrupt entrenched power structures, enabling a shift toward decentralized, co-governed, and transparent academic publishing—ultimately realizing a more authentic form of open access. the author envisions an ideal future in which a decentralized academic community forms the core, while centralized commercial services operate at the periphery as supportive infrastructure.However, the transition to such a system faces significant obstacles—including institutional inertia, resistance from capital interests, and technical barriers. Reflecting on past movements and stakeholder motivations may reveal more pragmatic strategies. One such approach is "parasitic transformation".

The second scenario explores the implications of embodied intelligence and brain-computer interfaces for academia, society, and ethics in 200 years.

Keywords: blockchain, artificial intelligence, decentralized, strategic foresight, publishing, academic, peer review, open access, dao， brain-computer interface

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2. Methodology

2.1 Qualitative Research

This study focuses on a highly uncertain future scenario (2030–2200) and therefore adopts a qualitative research approach. It applies the Strategic Imagination Circle methodology developed by Canadian professor Alexander Manu for data collection and analysis. In addition, language refinement was supported by tools such as Deepseek and ChatGPT.

2.2 Data Collection

The data were collected from academic paper websites available in both Chinese and English (including IEEE Xplore, arXiv, Web of Science, and Google Scholar) and forums such as Quora and Zhihu, covering the period from 2000 to 2025.

2.3 Data Analysis

Our goal is not to predict the future, but to shape it through the questions we ask.Therefore, we apply the Strategic Imagination Circle method (Manu, 2007), which includes six stages:

1. **Signal Identification**: In Literature and Stakeholder analysis, we will collect relevant signals from academic databases and industry reports.
2. **Signal Mapping**: This section will map these signals to understand emerging trends and patterns.
3. **Imaginative Questions**: Based on the signal mapping and case study results, we will generate imaginative questions. These questions will explore potential future applications of DeAI and its disruptive impacts.
4. **Define Points of Departure**: Using the imaginative questions, we will define points of departure. These are specific areas or scenarios where new insights can be applied to drive innovation and strategic planning。
5. **Future scenario**: This section integrating signal behaviors into existing behavioral models to illustrate how traditional views may shift toward new possibilities. We construct narrative prototypes that reflect plausible shifts in academic publishing, governance, and user roles.
6. **Opportunity Modeling**: In this section, we focus on examining the viability of the approach and its potential societal impact. We employ a Backcasting methodology to retrospectively deduce the feasibility and necessary steps for realizing the future scenario. For instance, if current technology remains immature, it may be necessary to revise the timeline or explore alternative solutions.

3. Literature review 1

This chapter thus aims to provide an overview of the four phases of academic publishing, identify research gaps, and propose future research directions.

3.1 Non-profit period (1920-1950）（Centralized）

Around the 1920s, science was widely regarded as a non-profit, collective asset of humanity. The purpose of academic journals was purely the dissemination of knowledge. As such, scholars did not emphasize copyright ownership, and publishers operated at their own expense, with funding typically provided through government or university grants. Most academic publishers were affiliated with universities or state-supported scientific societies.

In terms of process， the traditional academic publishing process typically involves manuscript submission, peer review, editorial decision-making, revisions, and final publication—a process that can take from several months to over a year.

However, without profit, there was little incentive for expansion, and limited publishing resources could not keep up with the rapidly growing demand for research dissemination.

3.2 Traditional Subscription Model period (1950- 2000）（Centralized）

Thus, British government official Maxwell and scientist Rosbaud implemented the earliest commercial profit model, they collect subscription fees from institutions or readers. They transformed originally free journals into subscription-based publications, hired leading scholars as editors-in-chief to attract subscriptions and submissions . Moreover, Maxwell required that published papers transfer copyright to the publisher, not the author.

Although many scientists at the time viewed Maxwell as a "villain," most remained indifferent, as they did not bear the cost of subscriptions themselves. The real burden fell on university libraries and academic institutions, which struggled to afford journal subscriptions as prices continued to rise around the year 2000. According to 2015 statistics, global annual spending on academic journal subscriptions reached as high as €7.6 billion.

In terms of discourse power, by the 1970s, journal competition intensified and libraries became more selective. To increase their influence, publishers adopted the “impact factor” system. This shifted the power dynamic: scientists who published in high-IF journals gained easier access to jobs and funding, reversing the earlier relationship where publishers courted scientists. Journals now held the upper hand, firmly establishing their authority. Even researchers previously unconcerned about finances began to realize the seriousness of the situation.

Although the traditional publishing model long served the academic community, the rise of the paywall significantly hindered knowledge dissemination. It also impacted research funding structures: researchers must invest significant time and effort into grant applications, which often leads to the Matthew effect—where established scholars monopolize resources. This marginalizes younger researchers and stifles innovation. Other problems include long publication cycles, biased peer review, lack of transparency in reviewer feedback, and favoritism toward reviewers' own work.

3.2 Open Access period (2000s to present)（Centralized）

Therefore, in the 1990s, the Open Access (OA) movement emerged on a large scale, leveraging internet technologies. The core of the movement is to respect authors' rights while offering academic information for free on the internet to liberate scholarly communication.

This section will discuss the types, trends, and models of the movement.

3.2.1 Type

Types of Open Access are divided into two main categories: Journals and Repositories. The difference is that Journals are for-profit, while Repositories are non-profit storage tools.

（1）OA Journals like traditional journals, employ peer review. Based on the fee model, they can be categorized as follows:

1. **Diamond OA model**: Free for both authors and readers, led by non-profit organizations.
2. **Gold OA model**: Authors are charged an article processing fee (APC), led by publishers.
3. **Green OA model**: Free for both parties, allowing the storage of preprints or postprints, led by non-profit organizations.
4. **Black OA model**: Refers to the illegal free provision of full academic papers, such as Russia's Sci-Hub. It bypasses publishers' paywalls using various methods and provides academic works without regard to copyright issues. Some scholars argue that while black OA has limited impact on publisher revenues, it weakens the promotion of green OA.

（2）OA Repositories do not implement peer review and are free for both parties (Green OA). Content allowed includes preprints, postprints, or experimental data. Preprint refers to a draft of research that has not been peer-reviewed but has been shared publicly, and in the traditional process is only privately spread before submission.

Repositories have shown strong potential to rival journals. Since 1991, physicists extensively adopted arXiv using it as a default submission point. This shift gradually decoupled citations, collaboration, and reputation from traditional journals, forming an independent ecosystem. As arXiv has grown in popularity, people have begun to question the need for traditional physics journals (Keep Posting, 2016). In response, many journals began accepting arXiv preprints, effectively relegating themselves to a post-certification role. This precedent offers valuable insights for future transformations in scholarly publishing.

In conclusion, open access is predominantly led by two main forms: Green OA and Gold OA.

3.2.2 Full-OA Model *(MDPI、Frontiers and Hindawi)*

The BOAI initiative in 2002 is considered the beginning of the open access movement. A prominent radical organization within this movement, PlanS, proposed in 2021 to end the subscription model by making content free for readers while charging authors equally. In 2023, they introduced an even more radical proposal: making both parties free, with costs covered by a third party. As of 2025, the movement has developed for 23 years.

However, after the movement began in 2002, in order to profit, publishers shifted the publication costs onto authors and set high APC prices (ranging from $2,000 to $5,000) using the gold OA model. Of the charges, only 15%-20% account for actual costs, while the majority of the profits are used for operations and promotion. Large publishers following this model include MDPI, Frontiers, and Hindawi, all founded around the year 2000.

This model has led to two main controversies: first, many authors and institutions cannot afford the associated fees; second, some publishers charge fees while neglecting the quality of peer review, undermining academic credibility and contributing to the rise of predatory journals. Both of these issues harm the interests of the academic community.

*3.2.3 **Hybrid-OA Model** (Wiley、Elsevier、Springer Nature)*

In the previous Full-OA model, new publishers explored open-access publishing but remained limited in scale. Consequently, in 2015, the European Union's PlanS and the U.S. Fair Access to Science and Technology Research Act of 2015 mandated that publicly funded research must be published in open-access journals, placing significant pressure on subscription-based publishers. In response, publishers integrated open-access and traditional subscription models, leading to the emergence of the Hybrid OA model.

Under this Hybrid OA model, authors may choose to pay APC, typically higher than in the Gold OA model, to make individual articles openly accessible. Meanwhile, the remainder of the journal's content remains behind subscription paywalls.

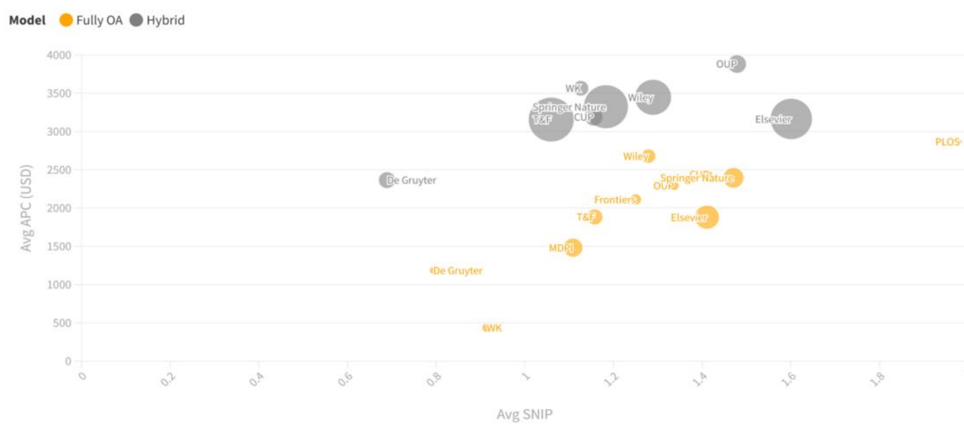

Figure 1

Pricing comparison between full OA and hybrid OA. From Delta (2021).

This model has sparked controversy due to its dual revenue streams: although individual articles may become freely accessible after authors pay the APC, subscribers continue to pay fees to access non-open articles, creating a problematic scenario of "double payment." This model has made scientific publishing one of the world's most profitable industries, with leading publishers maintaining profit margins consistently between 30%-40%.

Unfortunately, since 2020, Hybrid OA and Gold OA have become the dominant publishing models in academia.

3.2.4 Summary

Finally, the following figure summarizes the three publishing models discussed: traditional subscription, Full-OA, and Hybrid OA.

Time	Before 2000	2000-2018				2018-Now			Future
Mode	Subscription	Full OA				Hybrid OA		OA Repository	Blockchain
		OA (ideal)	Diamond OA	Gold OA	Green OA	Subscription	OA		
Author Pay /each paper	$ 0	$ 0	$ 0	$ 2,000	$ 0	$ 0	$ 3,000	$ 0	Free $ 20
Reader Pay /each paper	$ 30 ($5,000/annual)	$ 0 ($0/annual)				$ 10 ($5,000/annual)	$ 0 ($250/annual)	$ 0 ($0/annual)	$ 0 ($0/annual)
Peer review	Unpaid	Unpaid							Paid
Copyright	Publisher	Author			Author/Publishe	Publisher	Author	/	Author / Dao

Figure 2
Pricing and copyright in different publishing models

These three publisher-led models have sparked dissatisfaction among scientists and research institutions. For example, in 2012, numerous prominent scholars and over 12,000 academics launched the Academic Spring movement to boycott Elsevier, urging scientists not to publish their research under publishing conglomerates. In 2011, Kazakh graduate student Alexandra Elbakyan founded Sci-Hub, releasing paywalled papers for free through various means.

However, it is evident that due to the overwhelming financial power and influence of publishers, the legal system and state apparatus have clearly taken their side. For instance, in 2015, Elsevier and the American Chemical Society (ACS) filed lawsuits against Elbakyan in the United States. She was ordered to pay $15 million to Elsevier and $4.8 million to ACS in damages.

Today, open access is regarded as the most promising hope for reform and has already drawn significant effort and dedication in an attempt to reshape the current academic publishing landscape.

3.2.5 Data in OA Models *（2020-2025）*

OA's high growth rate: Over the past decade, OA has grown at a high rate (18% CAGR).

OA's first stagnation: In 2023, OA share shows its first decline in years, from 49% to 48% . (Delta Think, 2024)

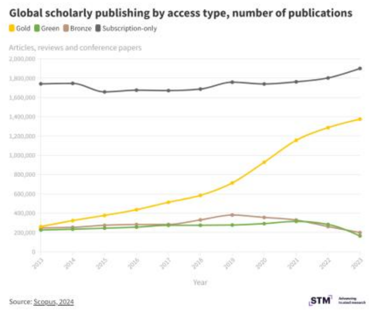

Figure 3
Global OA share. From Scopus (2024).

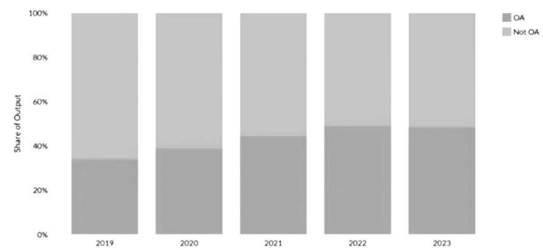

Figure 4
OA share if Ariticle Output. From Delta (2024).

Market fragmentation: high-impact hybrid journals maintain high prices through brand dominance, while gold OA journals attract low- and middle-income scholars through discount policies and institutional partnerships. Income scholars are forced to choose low-end OA journals, while elite groups continue to monopolize high-impact platforms.

Matthew effect： 2025, more than 75% of articles are published in the journals of around 20 publishers, with the majority of articles to be concentrated in the journals of 3-4 publishers.

Transformation Progress in Mainstream and Niche Markets： In major academic nations (primarily China, the United States, and Europe), OA and transformative agreements have progressed slowly (<30%); conversely, smaller academic countries have experienced rapid advancement (>60%).

Mainstream Journals Continue to Maintain Paywalls: 80% of prominent journals continue operating under subscription models, while only 20% have transitioned to Open Access (OA) (ESAC, 2025).

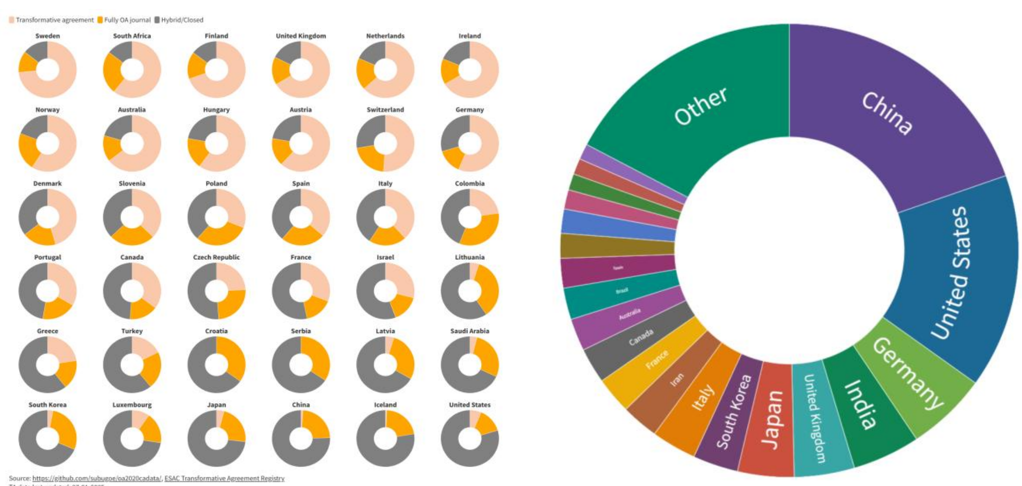

Figure 5
Transformation progress in different regions and proportion of articles published in different countries. From ESAC(2025).

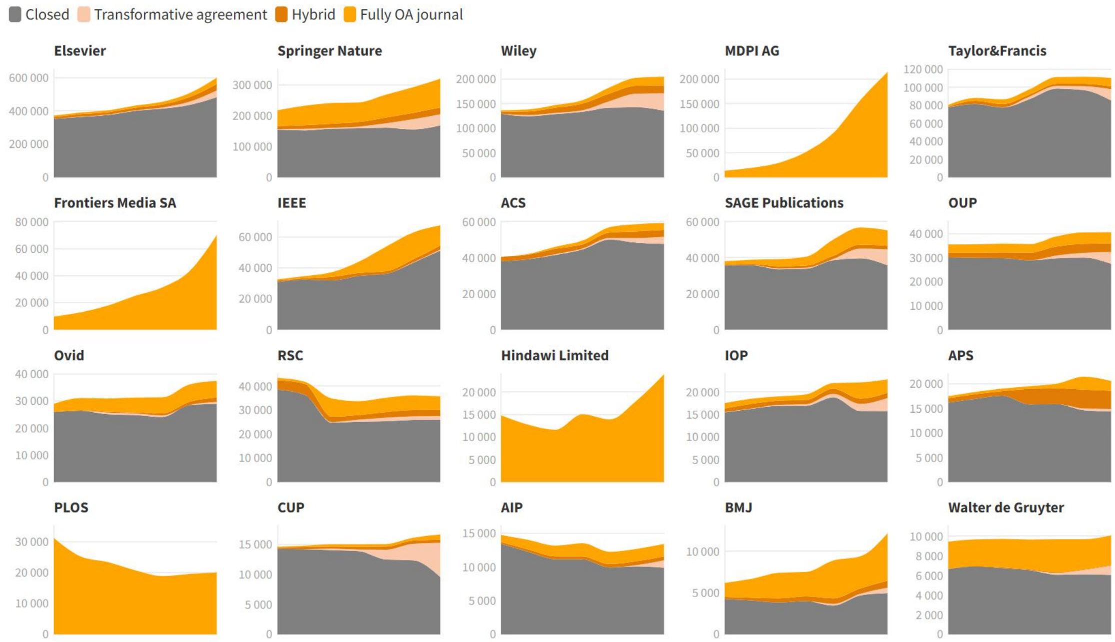

Figure 6

Publishing Model Types of Mainstream Journals. From ESAC(2022).

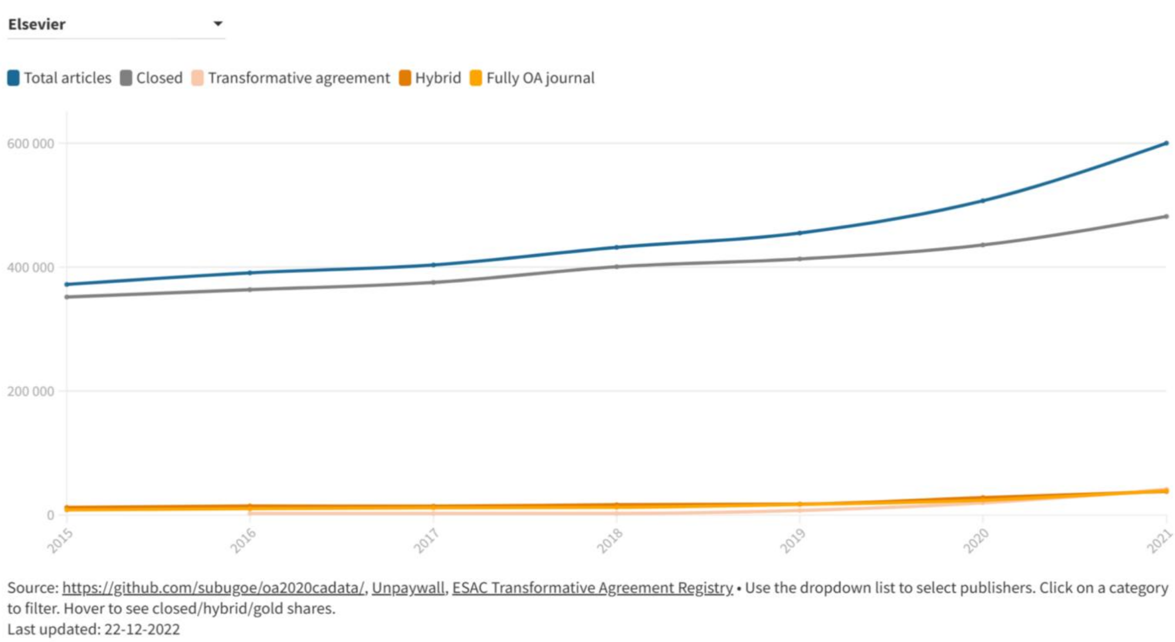

Figure 7

Publishing Model Types in Elsevier. From ESAC(2022).

3.3 Decentralized AI Publishing Period (Late 2010s–Present)

This section is divided into three parts: first, blockchain and AI technologies are introduced separately; second, their combination is discussed; finally, the integration of blockchain, AI, and academic publishing is summarized.

3.3.1 Blockchain

The first technology, blockchain technology enables permanent storage, decentralized content verification, and copyright management, creating immutable and transparent publication records, thereby improving fairness and efficiency in peer review. This new model ensures free dissemination of academic work and provides authors with a more transparent and equitable revenue distribution mechanism. Key technologies include:

1. **Decentralized networks and store:** Data is stored across multiple nodes to ensure transparency and immutability; by eliminating central control points, they enhance resistance to censorship and trust efficiency.
2. **Cryptography**: Employing hash functions and asymmetric encryption to secure data.
3. **Smart Contracts**: Code-based contracts that automatically execute agreed terms, reducing human intervention.
4. **Zero-Knowledge Proof (ZKP)**: A cryptographic method allowing two parties to verify the validity of a statement without revealing any additional information.

In the late 2010s, blockchain technology began to emerge; by the early 2020s, research shifted from initial technological feasibility to economic models and governance mechanisms, such as decentralized academic funding and the restructuring of governance structures. However, as of 2025, many current Decentralized AI (DeAI) projects remain experimental, often accompanied by hype and speculative bubbles. According to Gartner's Hype Cycle, blockchain and AI technologies are currently situated at the "Peak of Inflated Expectations."

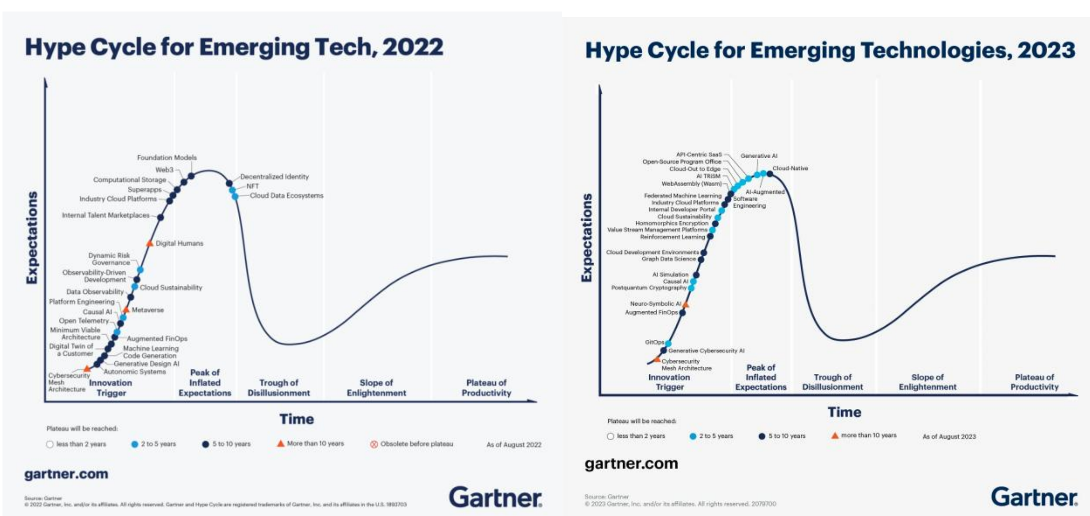

Figure 8

Hype cycle for AI and Blockchain. From Gartner(2022-2023)

Blockchain technology has several key applications in academic publishing:

- **Transparent Peer Review**: Reviews stored on-chain provide transparency, traceability, and immutability.
- **Decentralized Copyright Management**: Smart contracts automate and streamline royalty payments, enabling transparent, trusted transactions without centralized authorities (e.g., Molecule's patent NFT project; Savelyev, 2018).
- **Traceability**: On-chain evidence storage can effectively address disputes over academic priority and protect authors' copyright.
- **Decentralized Funding**: For the first time, research funds are allocated through community voting, decentralizing academic funding decisions. Funding sources are no longer limited to governments or large institutions; the general public can participate directly, exemplified by biomedical DAO platforms such as Molecule.
- **Tokenized Incentives**:Participants engaging in community building can receive tokenized incentives, either financial or non-financial. For instance, on the ResearchHub platform, users earn ResearchCoin tokens through peer review, paper contributions, and feature development. Currently, ResearchCoin has 9,322 holders with a market capitalization of $35.7 million.
- **Decentralized governance :**Unlike the traditional system, where data, pricing, and governance are monopolized by centralized editorial boards, blockchain publishing aspires to redistribute these powers to a broader academic community through decentralized governance.

However, Blockchain academic faces several barriers:

- **Technical Challenges**: Decentralized storage lags behind centralized services (e.g., Google Cloud) in performance, such as read-write speeds and IPFS retrieval latency. Challenges stem from node heterogeneity, hardware disparities, and complex data sharding requirements. Although current technologies have alleviated some issues, fundamental bottlenecks remain unresolved.
- Barriers to Adoption: Currently, non-technical individuals still face certain technical barriers when utilizing blockchain technology.
- Cultural Conflict: Decentralized models have not yet established widespread credibility within academic communities, as their open culture may conflict with traditional academic values.
- **Trust Costs**: In academia, new systems typically require several years to a decade to gain sufficient trust.
- **Conflict of Interest**: Decentralized technologies may disrupt existing business models, thereby weakening their market control.

Some optimistic scholars suggest that blockchain integration may transform publishers from content monopolists into technical service providers, concentrating on value-added services such as editing and peer review (Zhao, 2018).

3.3.2 Artificial intelligence

The second technology is artificial intelligence (AI).

Positive perspectives suggest that the application of AI in academic publishing simplifies the publishing process, enhances efficiency and review quality, improves research integrity, and reduces bias in peer review. Publishers such as Elsevier and Springer have already offered a variety of AI-driven services： journal selection tools, manuscript screening and preliminary review tools, plagiarism detection tools, reviewer recommendation tools, text summarization tools, and the publication of AI-authored books. For instance, Springer Nature published its first entirely AI-written academic book in 2019. However, critics argue that AI should not be recognized as an official author (COPE, 2024).

Negative perspectives include:

- **Lagging Behind:** Many scholars argue that AI judgments are based on existing knowledge, limiting their ability to recognize frontier innovations effectively (Lu, 2025).
- **AI Bias**: AI algorithms may amplify existing biases within peer review processes.
- **Transparency：** If the underlying algorithms remain undisclosed, there may be fairness concerns.
- **Need for Human Validation**: Many scholars argue that human validation and decision-making remain essential at all stages of publishing.

3.3.3 Blockchain and Artificial intelligence

Currently, blockchain and AI intersect in two primary ways. While there is significant discussion on how blockchain can aid AI development, comparatively less attention has been paid to how AI might assist blockchain. Specifically:

- **Blockchain Supporting AI**: Distributed blockchain networks enable broader, more efficient data collection, ensuring data security and immutability, thereby democratizing AI infrastructure, making it accessible, affordable, and inclusive.
- **AI Supporting Blockchain**: AI enhances the efficiency of analyzing and managing blockchain data, helping reduce blockchain's energy consumption. AI applications in blockchain mainly focus on security optimization and smart contracts, exemplified by CertiK (smart contract auditing) and Chainalysis (on-chain data analysis).

The integration of blockchain, AI, and academic publishing remains in its infancy, with limited existing literature.

The traditional subscription-based model has long served the academic community, but its high costs have significantly restricted the dissemination of knowledge. The emergence of Open Access (OA) aimed to address this issue, yet the commercialization of gold OA by publishers has turned OA into another form of centralized power and monopoly. True decentralization in knowledge dissemination remains unachieved. However, the advent of blockchain and artificial intelligence (AI) brings new hope for realizing genuine decentralization.

3.4 Research Gaps

1. Lack of a systematic framework: Existing studies often focus on blockchain or AI in isolation, resulting in significant technological silos and a lack of systematic design for a collaborative "blockchain + AI" framework.
2. Lack of revolutionary pathways and experience-based synthesis: Most existing literature discusses idealized future designs, but lacks concrete roadmap planning—particularly regarding pathways for power restructuring.
3. Lack of academic ethics discussions: Current studies rarely examine how blockchain's openness and speculative culture align with academic ethics. For instance, open peer review and DAO-based anonymous voting mechanisms remain highly controversial.

3.5 Research Questions

This paper aims to analyze the technological, economic, ethical, and political dimensions of scholarly publishing, projecting the publishing ecosystem over the next 20 to 200 years under the influence of blockchain and AI. It proposes an anti-speculative, inclusive governance model that promotes value distribution based on academic contribution rather than capital dominance.

Primary Question

How can decentralized AI architectures restructure the academic publishing ecosystem？

Secondary Question

Economic Dimension

1. How can a sustainable token mechanism be developed to support scholarly content? If academic influence is tokenized, how can speculative behavior be prevented from compromising academic integrity?
2. What is the impact of tokenization on the development of individual scholars' personal brands?

Social Dimension

3. How might predatory publishers adapt to control decentralized systems?
4. Could power structures fundamentally shift? If authority returns from centralized institutions to a decentralized scholarly community, how might the roles of those institutions evolve?

Ethical Dimension

5. How can latent ideological biases within AI-based peer review systems be detected?
6. How can the Matthew effect be mitigated in a decentralized context?
7. How does decentralized publishing affect early-career researchers' career progression patterns?

Legal Dimension

8. What kinds of regulations could be introduced to limit Article Processing Charges (APCs)?

4. Stakeholder analysis 1

This section outlines the prioritized needs of key stakeholders to anticipate who may drive change and what strategies they may adopt during different phases of transformation.

4.1 Authors'Needs

1. **Recognition:** Publishing in high-IF journals brings direct professional recognition.
2. **Wider Reach:** Silvia He (2024) found that rather than funding, Chinese authors choose OA mainly for broader readership, higher citation rates, faster publication, and a belief in open science. Institutional influence remains the dominant factor in journal and publishing model selection.
3. **Reduced Financial Burden**: Institutional funding is often insufficient to cover authors' publishing needs.
4. **Faster**: Scholars seek quicker timelines for promotion, graduation, or first-mover advantage, as seen during the COVID-19 publishing surge.
5. **Evaluation Reform**: Funding success strongly correlates with h-index, pressuring scientists to chase popular topics.
6. **Fairness & Transparency**: Authors demand transparent peer review and exposure of biased evaluations.

Reform Drivers: Dissatisfaction with APC and paywalls， Criticism of the impact factor game.

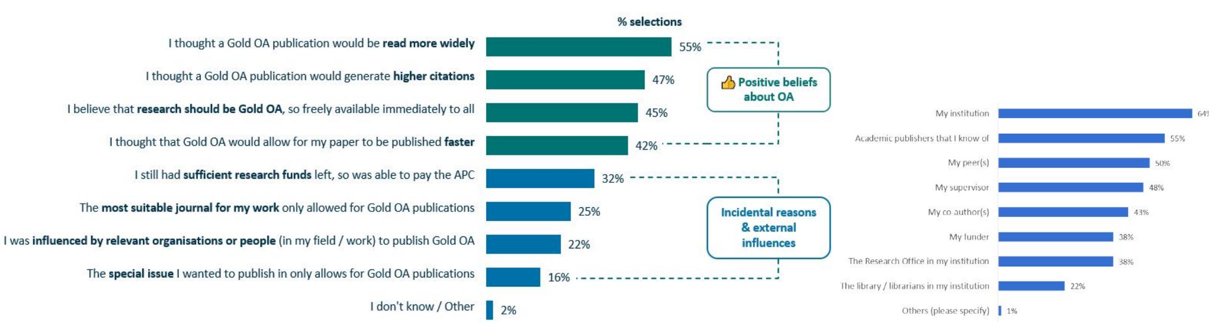

Figure 9

The reason you choose OA and the people influence your to Gold OA . From Silvia He (2024).

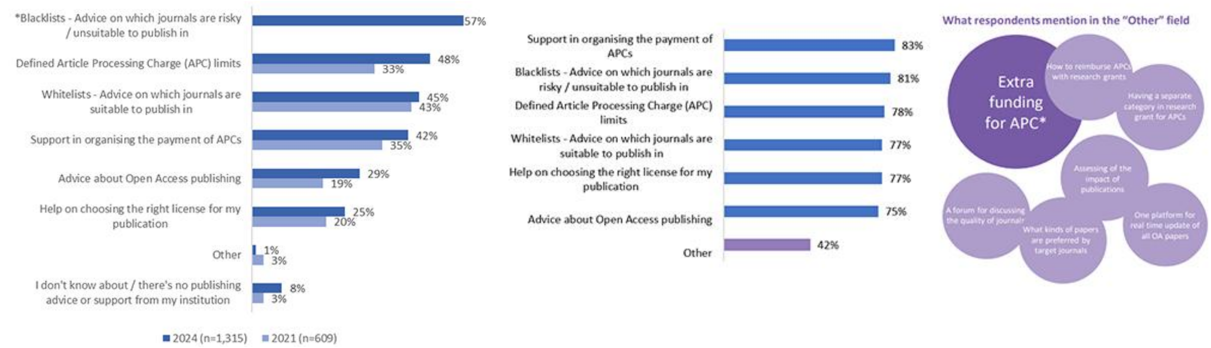

Figure 10

Support from institution and Request for more publishing support. From Silvia He (2024).

4.2 Readers' Needs

1. **Convenience**: Many Sci-Hub users report using shadow libraries primarily for ease of access rather than cost-saving (Charleston Conference, 2016). Professor Bo-Christer Björk (2016) identified three reasons for their popularity: usability, perceived ethical acceptability, and minimal legal risk (Travis, 2016).
2. **High quality**：Access to high-value and credible academic material.
3. **Low Cost**: Minimizing or eliminating fees for accessing academic materials.

Reform Drivers: Convenience, affordability，

Anti-reform Drivers: Maintaining academic quality and credibility

4.3 Peer Reviewers' Needs

1. **Professional Recognition**: According to Publons (2018), 83% of reviewers seek career incentives and believe peer review should influence academic status.
2. **Controversy over Payment**: While compensation can improve review quality and efficiency, it may also increase low-quality submissions, operational costs, and academic capitalisation.
3. **Time pressure**: Editors often require several weeks to find a reviewer willing to accept the invitation. After acceptance, the median time to complete a review is 16.4 days. According to a Publons survey, review completion rates have declined year by year up to 2018.
4. **Fairness Mechanisms**: While many reviewers prefer anonymous (single/double/triple-blind) systems for impartiality, others advocate for open peer review to enhance accountability.
5. **Relevant Submissions**: Reviewers prefer manuscripts aligned with their expertise and of sufficient quality.

Reform Driver: The current system relies on unpaid labour while systematically ignoring its academic value.

4.4 Research Institutions' Needs (Public Universities, Institutes, Funding Agencies)

1. **Reducing Financial Burden**: Journal subscription fees impose heavy budgetary pressure. Since total subscription cost often outweighs individual journal quality benefits, institutions tend to support gold OA publishing to reduce expenses.
2. **Enhancing Impact**: Publishing in high-IF journals boosts institutional competitiveness, such as improving QS rankings; OA models and preprint platforms expand dissemination and enable rapid publication for first-mover advantage.
3. **Reforming Evaluation:** Over-reliance on impact factors is seen as detrimental to innovation; institutions seek multidimensional metrics to encourage original contributions.
4. **Lack of data governance rights:** publishing organisations control access to raw data.
5. **Maintaining Reputation:** Preventing Academic Abuse and Maintaining the Image of the Institution.

Reform Drivers:

1. Hoping to reduce financial pressure (though action may be conservative due to existing partnerships)
2. Dissatisfaction with being controlled by the IF Factor game

4.5 Government Needs

1. **National security：** Chinese government organises universities to build their own journals in the hope of controlling the storage, dissemination and evaluation standards of their own research results.
2. **Efficient utilization of public funds:** Most governments have passed legislation and funding to support OA and promote the return of publicly funded outcomes to the public domain. The Government needs to respond to public opinion questioning 'why publicly funded research is being monopolised by privatisation' and take action.
3. **Industry Stabilization:** Research management relies on publishers' authoritative evaluation systems and infrastructure such as databases. If radical measures are taken, abolishing the impact factor may lead to 5-10 years of disruption of academic services, sharp decline in transnational cooperation, and difficulties in quality control.
4. **International Competitiveness**: For instance, some universities leverage IF-related metrics in QS rankings to maintain institutional standing.
5. **Reduced pressure on research institutions:** Some governments have negotiated or legislated to cap publishers' pricing, alleviating subscription cost pressures on research institutions; for instance, Germany's Projekt DEAL consortium.

Reform Drivers:

1. **Funding structure（EU）**: In Europe, most research funding comes from the

government, giving funders greater control over research dissemination.

2. **Cultural alignment（EU）**: European societies show stronger acceptance of the idea of knowledge as a public good.
3. **Expanding the impact of scientific research（Global）**

Anti-reform Drivers:

1. **Cost and quality concerns （Global）**: Worries that the APC model increases research costs; open access may reduce consistency in paper quality.
2. **Publisher influence（US）**:Major publishers (US, UK, Germany) fund legislators and shape public discourse.
3. **National competitiveness（Global）:** Concerns that excessive openness could undermine national research advantages.
4. **National safety（CN，Russia）：** China tends to support decentralized cooperation models that align with its national governance framework but may oppose global academic communities that operate entirely beyond sovereign oversight.
5. **Free-market culture（US）**： Preference for market-based mechanisms and limited government intervention.
6. **Infrastructure gaps（Global South）：** OA infrastructure is underdeveloped in many developing countries, limiting effective participation.

Region	Support for Publishers	Support for OA	Key Actions	Motivations
EU	Low	High	Plan S mandates immediate OA. Fines for monopolies	Break commercial monopolies, promote
US	High	Medium	NIH OA Policy； Lax antitrust review for academic publishing monopoly (2023 Wiley acquires Hindawi)	Economic gains & knowledge hegemony
China	Medium (Regulation)	Medium	Antitrust probe into CNKI. "Action Plan for Excellence in STM Journals.	Technological autonomy & counter
Russia	High (State-controlled)	Low	Restrict access to international journals. State-owned journals prioritized.	State control & information security

Figure 11

Attitudes of different governments towards OA and monopoly journals

4.6 Traditional Subscription-based Publishers Needs（e.g.,Elsevier, Springer Nature）

1. **Profit Maximization:** Sustaining high-profit margins through dual revenue streams of subscription fees and APC.
2. **Reinforce authority:** The top five global publishers control over 50% of SCI journals and reinforce their authority through impact factors (IF) and journal rankings.
3. **Monopoly data:** Publishers maintain control by restricting access to citation networks and peer reviewer databases, and by retaining copyright, prohibiting authors from distributing PDFs or publishing directly on-chain to bypass paywalls.They may deploy private blockchains with high APC fees to create pseudo-decentralized systems, aiming to tame the revolution, manage public pressure, and preserve the closed nature of their core assets.

4. **Controlling Government and Public Opinion:** Funding Congress, infiltrating academic institutions, and targeting scholars who support OA.

   Anti-Reform Drivers: Decentralization challenges its profit model， undermines its market dominance.

4.7 Open Access Publishers Needs *(e.g.* Springer *, PLOS, MDPI)*

1. **Scale Expansion:** Attracting authors through high-volume output (e.g., MDPI publishing 100,000 articles annually) and expedited peer review processes.
2. **Reputation management:** Addressing reputational risks arising from accusations of "predatory journals" (e.g., the delisting of Frontiers journals from the SCI).

   Anti-Reform Drivers: Decentralization challenges its profit model.

4.8 New Capital Needs

1. **Monopoly:** Exploiting vulnerabilities in early DAO governance mechanisms (e.g., low voter turnout, token centralization) to enable capital infiltration.
2. **Data Control:** Academic behavioral data not yet fully dominated by traditional powers (e.g., citation networks, peer review records) holds significant commercial value.
3. **Rapid Profit-Seeking:** New capital tends to pursue quick returns (e.g., speculating on academic tokens and creating predatory on-chain journals), whereas the academic system requires gradual reputation building; establishing credibility for on-chain journals may take 5–10 years.
4. **Sustainability**
5. **High retur**n, low risk
   Reform Drivers: Securing dominant positions in the reform.

   Anti-Reform Drivers: Monopoly

5. Signal Mapping 1

5.1 Chain of interests of capital

Throughout the OA movement, the original intention was to share knowledge equitably, but the actual evolution has seen publishers take advantage of the new system to reap higher profits and continue to exploit authors and institutions. This has led to criticism from scholars, and as a result, publishers have made some compromises each time, but these compromises have been incomplete, and most journals still adhere to the Hybrid OA model. It is clear that there is a need to find effective incentives for change, rather than relying on 'pseudo-open' compromises by publishers.

These 'pseudo-compromises' reveal the powerful chain of interests of capital: capital controls the evaluation criteria so that any scholar who deviates from the traditional evaluation system will face professional penalties, allowing capital to gain pricing power. High-IF journals, assessment officials who rely on indicators, and senior scholars who have adapted to the old system form an 'iron triangle'.

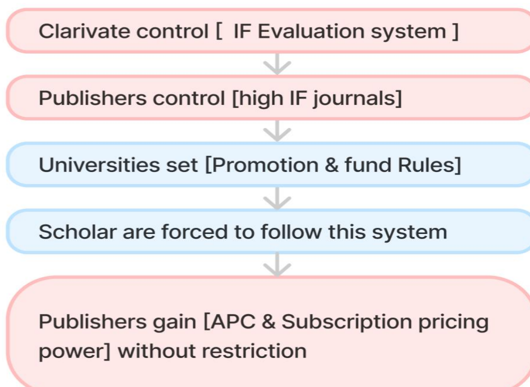

Figure 12
Interest chains

Although resistance against the existing order occasionally surfaces, the overwhelming financial power and influence of publishers ensure that the law stands on their side.As a result, we see a bizarre situation: a vast yet fragmented population of scientists is either forced to pay for access to their own work or must risk imprisonment and massive fines to confront the entrenched publishing industry.

6. Imaginative Questions 1

Could there be a way, like the publishers’ profit model, for scholars to legally gain value from their own research outputs?

7. Points of Departure 1

Moreover, the author argues that the research outcomes of any individual or team in science must undergo independent verification by the global scientific community (e.g., the validation of quantum entanglement experiments across multiple continents). This mechanism is inherently aligned with the distributed consensus system of blockchain technology. Therefore, a certain degree of decentralization is both necessary and beneficial.

However, caution must be exercised against techno-utopian fantasies; complete decentralization is neither realistic nor necessary.Based on the experience of the Non-profit period (1920-1950）, academic publishing systems must be financially sustainable, and profit-driven organizations inevitably require business barriers and centralized structures.Therefore, the future should aim for a hybrid model—combining centralized, profit-driven entities with decentralized, non-profit governance systems.

The new system’s evaluation authority should be held by a scholar-led DAO. With the involvement of governments and respected scholars, the system features transparency, resistance to manipulation, decentralized and non-profit governance, and a fair royalty distribution model. It should enables scholars to escape exploitative structures and build a sustainable balance of interests among all parties.

8. Future scenario 1

This chapter envisions an optimistic future scenario of academic publishing based on blockchain and AI, grounded in literature review and stakeholder analysis.

In 2070, the basic landscape of the on-chain scholarly publishing industry had been established, with non-profit DAOs at the center of the circle and for-profit organizations at the periphery. Non-profit includes the governance protocol layer, and for-profit primarily includes the application and infrastructure layers.

All on-chain activities by individuals and organizations (e.g., peer reviews, publications, data contributions) are quantified into “Academic Reputation Scores” and “DAO Contribution Scores.” Governance power of each entity is calculated based on these metrics. The authority of the new evaluation system has been fully established.

8.1 Dao

At the governance level, by 2050, academic publishing is controlled by a blockchain-based Global Academic Community DAO. The DAO has the following characteristics.

8.1.1 Daogeographical structure

In terms of geographical structure， academic communities are divided into the global Dao, China Dao, Europe Dao, and Russia Dao.

In terms of membership, the Global DAO consists of on-chain publishers, all research institutions, all scholars, and all investors. It is governed by an Academic Council, composed of key publishers, research institutions, investors, and a large body of professional scholars (postdoctoral level and above).

8.1.2 Power structure

In terms of power structure, the DAO is responsible for oversight, proposal submission, and peer review. The Academic Council within the DAO holds governance authority and formulates rules for academic publishing and management (evaluation criteria, new impact factor standards, ethical frameworks, journal tier certifications, etc.).

8.1.3 Funding

In terms of transparency of funding， the DAO is a non-profit entity, funded by royalty fees from authors, government funding, and external investments. All assets are stored on an immutable public ledger, where anyone can freely view and verify the financial activities of all DAOs, including the source and destination of any asset transaction.

In terms of anti-monopoly design,the DAO has established the following rules:

1. First, a cap is imposed on the governance power of any single entity.
2. Second, participation in the Academic Council is not fixed; each year, members with high academic reputation or high DAO contributions are randomly selected across different roles. For example, publishers typically have higher DAO contribution scores and lower academic scores, while scholars tend to show the reverse.

3. Third, reputation assets are stratified annually and depreciated by a fixed percentage (e.g., 95%) to prevent system rigidity and the Matthew Effect; these assets remain de-financialized and tied to real-name identities throughout.
4. Fourth, each regional DAO establishes an Ethics Oversight Committee.

These strategies are inspired by Nobel laureate Elinor Ostrom's theory of "polycentric governance"—a system in which carefully designed rule networks enable self-interested actors to collectively realize public good, preventing privatization of power and ensuring that no single group can maintain long-term control over key governance nodes.

In terms of decentralization and diversification of academic funding, these new mechanisms have likewise become mainstream.

For Individuals and DAOs, These decentralized funding platforms (e.g., Molecule in 2025) have become mainstream. On this platform they can fund researchers directly on-chain, investing in academic content without intermediaries. Unlike traditional funding mechanisms, this process is entirely transparent—anyone can trace fund flows on-chain, and no party can alter the records.

For DAOs, the allocation of academic funding no longer overemphasizes quantitative indicators or short-term academic returns (such as bias toward popular topics that pressure scholars to publish in high-citation journals). Instead, DAOs focus on the long-term development of science, using AI and human scholars to create academic diversity indices, granting greater weight and subsidies to high-potential, niche fields.

In terms of its anti-financialization design, the DAO enforces rules prohibiting token trading, and funders are generally required to lock their tokens for 3–5 years before they are eligible to share in any returns.

8.1.4 Distribution and Use of Academic Incentives

In terms of distribution and use of academic incentives:, Non-financialized academic tokens and DAO contribution tokens serve as professional incentives, widely used to promote community governance (including peer review, manuscript evaluation, academic discussions, etc.). Although these tokens are non-tradable, they can be redeemed for research-related expenses (such as APCs). This significantly increases participation, quality, and motivation in community governance activities while preventing the capitalization of academia.

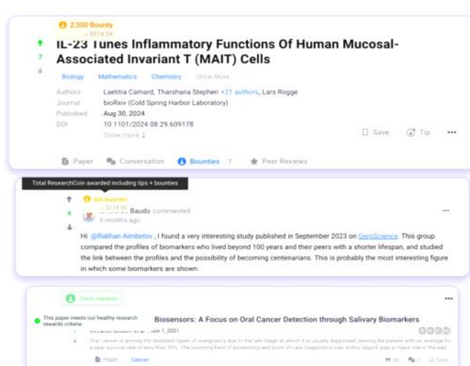

Figure 13

Financialized Token Incentive. Adapted Research Hub (2025).

8.2 Qualitative and Quantitative Evaluation in Research Institutions.

95% of research institutions, universities, and academic funding bodies recognize and adopt new on-chain metrics, incorporating them into funding, hiring, and promotion criteria. These institutions continue to follow the standard sequence of “quantitative for initial screening, qualitative for final decisions,” with qualitative evaluation criteria still primarily determined internally.

However, key differences include:

1. First, the evaluation relies primarily on quantitative indicators established by the DAO, which apply not only to journal publications but also to independently published research outputs.
2. The entire review process is recorded on the blockchain and made accessible to the academic community (quantitative data is fully public, while qualitative review content is semi-public).
3. Smart contracts are configured to hide the paper’s quantitative metrics during qualitative review; in case of disputes, arbitration committees may decrypt all information.
4. AI is used to reduce the cost of qualitative review by developing intelligent review agents for support.

8.3 Copyright and royalty revenue distribution

The copyright usually belongs to the author himself. 80% of people choose to publish publicly, but if you choose to publish in subscription mode, the copyright proceeds will be automatically split by smart contract, usually the author himself (>40%), the journal publisher (<30%), and the DAO (<30%, used for public research funds).

The revenue-sharing structure is designed primarily to motivate authors while fundamentally reversing their previously exploitative role, empowering them as key stakeholders. Secondly, it accounts for the public interest. Lastly, it grants publishers a reasonable share to sustain their participation incentives.

8.4 Peer review

In terms of the structure of peer review, the review in Dao will be structured with “expert authority as the anchor point, Dao community wisdom as the corrective, and artificial intelligence as the screen”. Among them, the expert authority is the senate composed of Nobel Prize-level scholars; community wisdom means that scholars with PhD and above can participate in peer review and dispute review； scholars with less than PhD can initiate proposals and play a supervisory role; artificial intelligence screening refers to the relevant screening and preliminary quality determination.

In terms of the process, AI first classifies the paper and predicts its quality. Then, the reviewer pool is updated quarterly, and suitable reviewers are randomly assigned to conduct double-blind peer review, with the entire process executed on-chain. Finally, reviewers receive community contribution scores and academic reputation scores directly from the DAO via smart contracts. After the review is completed, to ensure its quality, the author or other community members may file complaints, which will be re-evaluated through triple-blind review by randomly selected relevant members via AI. The quality, quantity, and speed of reviews influence both the score earned and the likelihood of being recommended again as a reviewer. These measures collectively ensure fairness, efficiency, quality, and motivation in the peer review system.

In terms of anonymity culture, given the respective advantages and disadvantages of open and anonymous peer review, both modes are retained. However, reviewers who choose open review receive additional professional incentives, such as academic reputation scores and Dao contribution scores.

In terms of anti-monopoly measures, relevant rules are embedded in smart contracts. First, a baseline recommendation probability is established. Second, reviewer selection must include scholars of varying levels of seniority. Third, blockchain technology records review comments and the quality of citation relationships, forming a traceable relational graph to detect abnormal mutual assistance.

8.5 Publishing mode

For scholars, under the new system, mainstream publishing options have shifted and now include three primary models:

1. Preprint Publication
2. Self-Publishing(new)
   Submit to the DAO, and after free peer review（by AI and human）, the work is formally published. （Optional publishing services such as promotion can be purchased as needed.）
   Self-Publishing is a new model proposed by the author for the DAO in 2050. This model ensures review quality while maintaining low cost and high efficiency. Under DAO rules, each publication receives a textual academic quality label and a new impact factor (IF) tag, which can be used in funding applications and academic evaluations. The system incorporates tiered classification: while all papers (except those involving academic misconduct) may be published, low-quality literature is systematically marginalized.Within this framework, open access (OA) journals lose competitiveness due to cost and diminished credibility, while subscription-based journals shift from being “essential” to “optional.”
3. Journal Publishing
   Submit to a journal within a DAO, pay an APC, and after peer review（by AI and human）and various publishing services, the work is formally published.
   Journal publishing continues to exist, aiming to deliver a full range of professional services and the added value of academic brand prestige.

The structure of these three models offers a healthier and more rational publishing ecosystem for the academic community.

8.6 Example

As a concrete example, in the year 2070, you are 32 years old, pursuing a PhD in computer science in Germany and preparing to graduate. You first upload your preprint to an on-chain preprint platform to obtain an academic priority timestamp. Based on AI recommendations, you choose to submit to a journal in the LLM field—an OA journal with a new IF of 10, highly recognized across Europe.

Fortunately, your paper passed the AI prescreening. You chose to pay an APC of $1,000 (of which 25% went to DAO public subsidies, 30% to AI assistance and human editing, 20% to marketing, 10% to technical maintenance, and 15% to publisher profit). Three peer reviewers—PhDs and professors in the same field—conducted a double-blind review of your paper. After the review, the content was made public within the community while maintaining anonymity, though one reviewer opted to reveal their identity to gain additional academic reputation points.

Based on feedback from anonymous editors and peer reviewers, you make minor revisions, after which an editor assigns your paper to Zone C. This decision is recorded on the public blockchain. Believing the decision to be subjective, and after failed communication, you submit a formal appeal to the DAO with additional information. Based on keywords related to the dispute, your appeal is sent to 20 shared editors within the DAO for triple-blind arbitration. Three of them review your case and side with you. The original editor's contribution score decreases, your paper is withdrawn from Zone C, and reclassified as "under re-review." Two permanent anonymous editors from the journal participate in the re-review and assign your paper to Zone B. After polishing the article, it is finally accepted and published. The entire process takes 60 days.

The on-chain depository honor score shows 30 points for first on-chain publication, 240 points for journal zone B, 10 points for open publication, and 2 points for preprint citation. You submit this on-chain reputation score along with the school's other metrics, and you apply for another qualitative review from the school to receive a favorable rating and successfully graduate.

2 years after graduation, your thesis gets 30 citations, you earn 10 academic reputation points. In addition you've been recognized by the AI for high quality research in a potential niche, so you've earned another 20 Academic Reputation Points.

8.7 The Transformation of Journals

The role of traditional journals has also evolved. To adapt to the new system, they have mainly taken one of three paths: on-chain certification providers, service/tool providers, or boutique journals. Under the governance of the academic community, 80% of research is openly published. Journals have not disappeared, but they can no longer profit from information gatekeeping. Instead, they gain value through service offerings, brand recognition, and elite networks, shifting their core competency from content monopoly to trust generation.

One path of transformation is that traditional elite journals leverage their brand value to become centralized certification service providers. However, unlike in the past, their monopoly has been dismantled—any influence, journal tier, or pricing must be validated by the Academic Council. These certification services include: initial editorial screening, randomly selecting matched scholars from the DAO to review and certify papers, editorial curation and packaging, and charging brand licensing and APC fees. Once specific conditions are met, papers are tagged on-chain with labels such as "Nature-grade" or "high impact," and the journal brand becomes a verified NFT badge.

Another transformation is toward becoming service providers leveraging their expertise and resources. Services include peer review, layout and formatting, blockchain certification, peer review system management, reviewer network coordination, and recommendation services. These publishers actively develop or acquire AI technologies to handle large-scale routine tasks, such as evaluating citation list quality and filtering paper quality.

8.8 Summary

In summary, DAOs control the authority of certification, individual scholars hold the power of peer review, and publishers offer value-added services. This model, rooted in decentralization with centralized elite organizations as functional plugins, establishes a technologically rigid form of academic democracy—an open yet controlled academic ecosystem governed by the scholarly community.

9. Opportunity Modeling 1

This section will detail the return, feasibility and Backcasting for the scenario.

9.1 Rate of return

In terms of rate of return, due to academic resistance against publishers, economic returns to society may decline, in the short term. However, in the long run, this will encourage the growth of academic output, which will indirectly translate into economic value for society. Therefore, the long-term academic and economic return rates are expected to be high.

9.2 Technical Feasibility

AI already offers a wide range of functions in academic publishing, and with another decade of advancement, it will be fully capable of supporting envisioned future scenarios.

As for the blockchain, Arweave and IPFS offer stable, low-cost storage (around $0.05 per paper), which can support thesis depository needs.

However, blockchain has problems with scalability and user learning costs. Solving these problems can take 5-10 years and requires technical expertise and significant capital investment, so the inclusion of new capital and technology geeks is very important.

9.3 Three key questions

In order to break the Chain of interests of capital, there are three important issues to figure out here.

1. Who is going to reform it? Is it the bottom-up consensus of the academic community, or is it the top-level design of government and capital?’
2. Where to start reform?
3. How to reform it?

9.3.1 Who?

First, regarding the question “Who will drive the change?”, stakeholders with revolutionary motivations include: scholars, research institutions, new capital, governments, and technological pioneers. Both top-down and bottom-up approaches to reform are viable pathways.

1. Scholars and research institutions indicate that they are the core driving forces through widespread resistance. In particular, early-career scholars are more open to new paradigms and have relatively simpler interest structures. This explains the potential for bottom-up reform.
2. Research institutions and authoritative scholars often possess stronger organizational and funding-attracting capacities than individual scholars. Therefore, trusted institutions and experts can be elected to take the lead; however, it is crucial to avoid academic institutions with speculative, profit-driven tendencies and to prioritize non-profit academic organizations.
3. New capital seeks profit so it may provide financial support.
4. Governments of European and Chinese are the two regions most likely to lead reform.

a. at the technical level, they accept distributed storage and smart contracts;
b. at the governance level, they maintain centralized regulatory frameworks;
c. at the incentive level, they cautiously explore tokenization mechanisms.

Referencing the open access movement, the early phase was driven bottom-up by scholars, and later supplemented by top-down policy support—both forces are essential. To gain government support, they will need to concede more power to the government, such as greater governance authority in the Dao.

5. While everyone has the potential to drive reform, everyone also carries the incentive to monopolize.

Stakeholder	Monopoly Risk	Motivation	Methods	Antitrust methodology
Scholars	Medium	Academic authority	Gatekeep peer review	Open peer review + citation diversity metrics
Institutions	High	Ranking dominance	Hoard data/resources	Mandatory data sharing policies
Governments	Medium	Ideological control	Funding censorship	International research alliances
Publishers	Extremely High	Monopoly profiteering	Exclusive copyrights	Open-access mandates

Figure 14

Monopoly motives of different stakeholders

9.3.2 Where?

Secondly, regarding the question "Where to start reform？" In the author's opinion, the reform should start from the root of the logic chain, which is the evaluation system. Before designing, in order to learn the lessons, we need to analyze the traditional evaluation system and the current reform.

The decision-making process in the traditional Evaluation system is generally divided into two steps: research organizations and funds rely on quantitative indicators (IF, H-index) for initial screening; and refer to qualitative indicators (peer review, etc.) for decision-making in the final stage. However, the review is easily influenced by quantitative data, resulting in non-high IF articles will not be read carefully.

Index	Control organ	Global Acceptance	Advantages	Disadvantages
IF/JCR	Oligopoly-Profit	Extremely High	authority	Easily manipulated, monopoly
H-index	Oligopoly-Profit	Medium	Highlight individual	Easily manipulated，Matthew effect
Peer review	Non-profit	High	professional	Time cost, Subjective
Altmetric	Profit	Low	Real-time	Weak academic relevance
Peer review (Dao)	Non-profit	Just start	Decentralized	Easily manipulated，tech threshold

Figure 15

The characteristics of traditional evaluation indicators

In terms of reform, it can be argued that Europe and China are at the forefront.

For example, Narrative CV, promoted by the Royal Society, encourages scholars to describe contributions in words rather than list metrics, highlighting the diversity of research. Piloted in a few universities, it faces issues like inefficient review and subjectivity; Altmetrics is a metric that tracks impact in social media, policy, but it is susceptible to manipulation; Another example is that some universities in the Netherlands, such as Leiden University, pushed for a reform of the faculty evaluation criteria in 2019, weakening the number of papers required and emphasizing multiple dimensions, with the advantage that young scholars have fed back that their work pressure has declined, the number of interdisciplinary research projects has increased, and they are more willing to try out long-term projects. However, the limitations are that the criteria are vague, which may lead to a network of relationships dominating the evaluation, as well as an increase in technical complexity, which has led to the creation of additional “open science officer” positions in Dutch universities. Then, in 2002, following the Netherlands, the EU Open Science Cloud set preprints and data sharing as mandatory requirements for fund applications, further promoting academic evaluation to de-commercialize indicators, As a result of the success, the weight of IF in the recruitment of Europe and the United States has significantly decreased.Similarly, China's Ministry of Education proposed in 2018 to stop blindly pursuing quantitative indicators, but the following problems have emerged: first, “quality” lacks an operational definition. Secondly, subjective tendencies such as “leadership approval only” have emerged; thirdly, some units have generated new quantitative indicators; fourthly, local institutions still rely on traditional indicators due to international ranking pressure or limited resources.

These experiences can inspire the reform on four points:

1. It is necessary to reduce the impact of quantitative indicators on qualitative review.
2. The upstream indicators (quantitative indicators) should be reformed first.
3. Thirdly, qualitative evaluation has the fundamental limitations such as easy to be manipulated and increase the cost, so quantitative indicators can not be abolished, need and qualitative indicators need to cooperate with each other. The optimization direction of quantitative indicators should be: transparent, anti-manipulation, efficient and low-cost.
4. Fourth, behind the reliance of scholars/research institutes on quantitative indicators is the demand, which needs to be addressed rather than prohibited by force.

9.3.3 How?

With regard to the third question, on “how to reform it?” The current force limiting the revolution is that the personal career risk of participating in the revolution is too great, resulting in most scholars not daring to come forward. The author believes that in order to release the power, it is necessary to first meet the academic survival needs of individual scholars, then reduce the career risks of scholars, and finally design a lower operational cost of change.

As a reference to that line of thinking, a similar success story in the open movement is that in the 1960s-1990s, most journals rejected preprint papers as toys, however scientists, dissatisfied with the efficiency of traditional journals, began to publish a large number of preprints first in arXiv in order to get ahead of the curve and were directly cited by globally renowned media outlets (e.g., the well known July 4, 2012 Higgs boson paper was published in arXiv six months in advance and cited by the BBC). This forced traditional journals to change their attitude (ASAPbio 2016 conference) and they started to receive arXiv preprints, bringing preprints and journals into symbiosis.

In this case, preprints served the needs of scholars by allowing them to claim academic priority ahead of others, evolving into a dual-track system of “posting preprints first, then following the journal process.” This effectively enabled scientists to establish their own fast lane, disrupting publishers’ monopoly over research validation (Daniel Garisto).

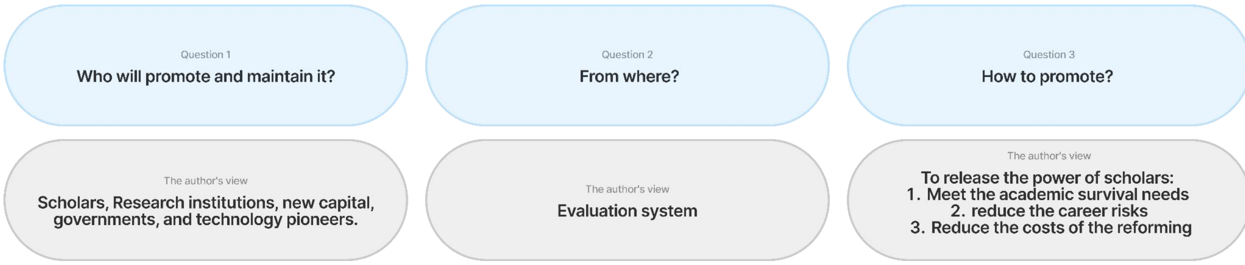

Figure 16

Answers to three key questions

9.4 Solution： Progressive parasitism

Integrating the answers to the three questions, the author proposes a "gradual parasitic" approach to revolutionize academic reputation systems, avoiding direct confrontation with journal authorities. The approach is as follows:

Under the guidance of governments and authoritative scholars, the academic community can, while still participating in the traditional system, use low-cost, secure, and anonymous encryption technologies to replicate traditional evaluation and reputation system onto the blockchain—creating a mirrored academic world. With the help of blockchain’s anonymous verification, this process protects scholars from potential retaliation and does not affect their standing within the traditional system.

The new system features transparency, resistance to manipulation, decentralized and non-profit governance, and a fair royalty distribution model. It enables scholars to escape exploitative structures and contributes to building a sustainable balance of interests among all parties.

The process unfolds in two phases: during the Parasitic Phase, the traditional system is used as a foundation to replicate reputation data and initially build a decentralized academic mirror. In the Symbiosis Phase, as the new system gains sufficient influence, power gradually returns to the scholarly community, and the traditional system is compelled to acknowledge its legitimacy—or even join the on-chain ecosystem to collaboratively build a win–win academic structure.

9.4.1 Parasitic phase (2025–2040)

The first phase is the parasitic stage (2025–2040), aimed at building a mirrored world of academic reputation to reclaim discourse power from traditional publishers.

Overall Framework. Key actions include: governments building infrastructure and providing legislative support; authoritative scholars establishing alternative academic evaluation systems; and a wide range of scholars uploading their work to help construct this mirrored academic world.

1. Infrastructure Layer: The government and regulated new capital should take the lead in building infrastructure.
2. Governance Layer: Research institutions, scholars, and national governments collaborate to establish a scholar community DAO, define initial rules for governance power allocation, encode anti-monopoly mechanisms (e.g., quadratic voting) into smart contracts, and relinquish contract ownership to ensure decentralization of authority.
3. Application layer： Likewise, at the application layer, governments, research institutions, and new capital can establish on-chain journals, which may take either centralized or decentralized forms.
4. Application layer： First, the DAO reevaluates traditional journals and metrics (e.g., impact factor), recalibrating them to form its own evaluation system, which is embedded into smart contracts to ensure resistance to manipulation.
   Second, the DAO should create a new self-publishing model that allows work to receive rigorous peer review and quality metrics, thus repositioning journals from a mandatory route to an optional one.
   Third, the DAO uses various incentive mechanism (academic funding, reputation points, and governance rights） and credible endorsement to attract scholars to participate in community development. The DAO offers a user-friendly interface to encourage researchers to tokenize past and current work as on-chain credentials, which are then validated by community algorithms.
   However, there are two key difficulties here: copyright issues and technological r esistance. Both, however, can be addressed through blockchain-based solutions.
   1. Copyright issue： About 30% of the non-exclusive copyrights in the results can be directly uploaded to the chain, but the remaining 70% of exclusive copyrights cannot be uploaded directly to the chain.
   2. Technological resistance： Publishers may include clauses in copyright agreements that prohibit authors from uploading their work to the blockchain.
   3. Solution: Scholars can employ various legal circumvention strategies to upload content on-chain without triggering copyright violations. One method involves storing only the hash fingerprint (not the full text) of a paper on-chain and using zero-knowledge proofs to verify academic contributions. This is akin to using a holographic projection to “virtually raise a cat” in an apartment where pets are banned—technically compliant, yet achieving the intended effect, while being extremely difficult to detect.

      To identify this “virtual cat,” publishers would need to:

      1.detect the hash (i.e., know that a paper was uploaded),
      2.decrypt it to confirm it corresponds to a copyrighted paper, and
      3.legally prove that storing a hash constitutes copyright infringement.

The second step is considered technically infeasible—even with the most powerful supercomputers available today. The third step lacks solid legal precedent, despite some publishers potentially attempting to lobby for regulatory changes.

Through these methods, research institutions and scholars can participate in both the old and the new systems without revealing their identities, thus avoiding suppression by publishers.

Example. To synthesize the above information and illustrate it more vividly, let us consider an example:

In 2030, at the age of 35, you are applying for Associate Professor of Materials Science, you wrote an article this year to Nature that was rejected, revised and then published in Nature Communications after a six-month review, and the contract prohibits full-text uploading to the chain.

But you would like to support the chain system building and have more voice in the future academic community, So you spent $10 to purchase a service that puts your paper title on-chain, published anonymously with your address, which encrypts the paper title as a hash “k9jf3...” Save it on the chain, verify to your peers with zero-knowledge proof that “I know the breakthrough method for a paper in Nature, and that method matches the hash k9jf3… Match” without revealing the specifics.

The chain of deposit shows that your points for the year include:

- One Nature rejected review record, 100 academic honor points;
- Revised publication in Nature Communications (IF: 12, IF（Dao）=11), which earns you 700 reputation points and the NFT label of “high quality research”;
- 40 citations (in 3 top journals and 5 general interest journals), 106 honorary points and “high impact” NFT.
- 4 peer-reviewed articles you have published, +38 academic reputation points.
- You have handled two academic cases in Dao, and gained 20 academic reputation points.
- Participate in the proposal of building the IF system on the chain, and get +50 points for Dao governance.

Compared with the traditional system, which only recognizes the impact factor of 12.5, the on-chain system reflects the overall quality of the research. However, the university does not recognize the on-chain score, so you submitted traditional data. After qualitative review, you were awarded the title of Associate Professor.

Quality grading and academic integrity building. Currently academic integrity and the proliferation of low-quality papers have become serious problems, and a better grading system and academic integrity in the chain can attract more scholars to join.

First, analyze the causes of the problem: In the 20th century when publishers needed to maintain subscription value through quality and the academic community was small, low-quality research was naturally eliminated through a hierarchical filtering mechanism, but this filtering mechanism had scale limitations, and the OA model and Internet technology lowered the cost of dissemination, and the soaring number of publications broke the filtering mechanism.As a result, low-quality papers are widely spread in the Internet and even in the media through free reading and search engines. Publishers take the opportunity to commercialize low-quality papers, form predatory journals and “paper assembly lines”, and disguise themselves as regular journals by increasing citations through cross-referencing and fabricating impact factors and editorial board lists.

Regarding the solution, then, the author believes that the cause of the emergence of low-quality results is the survival of the researcher, and behind this is systemic oppression, so it is unlikely that this demand for publication will go away, and therefore it should be approached from the point of view of dealing with the phenomenon rather than stifling the demand. Therefore, the improvement measures starting from 2035 include 3 points:

1. Strengthening filtering mechanisms(peer review)： First, the quality and scale of the review process has been increased through the previously mentioned peer review up-the-chain career incentive program.
2. Developing AI quality assessment plug-ins: DAOs or publishers procure or develop AI quality assessment plug-ins (public algorithms) for generating quality labels for papers to alert readers. The level of quality will determine how much exposure the research gets on the chain, rather than easily manipulated metrics such as the number of citations. This is analogous to food conformity labeling, where journals that do not employ relevant validation tools will not be trusted and be promoted.
3. Using Technology to Combat Academic Fraud: Impact factor fakery can be destroyed through AI and blockchain technology. For irregular mutual citations, AI will label them as “suspicious” and randomly assign three scholars to conduct double-blind validation, and the results will be made public on the chain, lowering the reputation scores of the scholars, reviewers, editors, and journals involved, and checking the implication of all other articles and journals.
   For academic misconduct, AI recognizes only 98% of shallow plagiarism and false information, raising the cost of counterfeiting. Though hidden errors, especially first-hand research falsifications, are still difficult to detect in the first place. However, after the error is discovered, AI is quickly able to find 99% of directly and indirectly affected papers through chain records, reducing the cost of forensics, and these technologies act like cameras in academia, leaving no place for crime to hide.
4. Government APC Policy: the European and Chinese governments set price limits for APCs and imposed a tax on journals with ultra-low rejection rates, which allows low-quality journals to still survive, but with profits generally below 15%, much lower than in the past .

Through these strategies, the academic community can rebuild an effective quality-based classification system, dispelling the stereotype that open publishing equates to low quality.

Case of Responding to Monopoly. Eighth, capital will attempt to monopolize Dao, from the infrastructure to the application layer. Possible typical cases and solutions are as follows:

1. The publisher attempted to acquire governance and reputation points in cash, however the related designs all used de-financialized tokens.
2. A monopolistic journal joins the academic community DAO and proposes to amend anti-monopoly rules to increase its governance power on-chain. However, since the smart contract has no admin privileges, the change must be proposed to all DAO members and requires 90% approval—making it nearly impossible to achieve through bribery or manipulation.
3. A publisher attempted to remove negative review records from the chain, but gave up due to data dispersed across 50+ country nodes and over $100M in operational costs.
4. A monopolistic journal attempts to lobby multiple organizations to form an alliance aiming to control DAO governance. However, the on-chain academic charter enforces strict rules: a single entity cannot hold more than 5% of governance power, and large entities like publishers are collectively capped at 30%. Scholars in the council are selected randomly from high-reputation individuals via smart contracts. Furthermore, if an organization is determined to engage in monopolistic behavior, the smart contract will automatically revoke its governance rights. These mechanisms make lobbying prohibitively costly and risky.
5. A publisher tries to bribe the AI to train a data labeling team to implant labels in the paper classification model that favor their journal. One of the community's academics discovers the anomaly through on-chain traceability, anonymously initiates a proposal for correction, and the AI randomly invites 1,000 community members from 67 country nodes to adopt the proposal and reduce the governance rights of the changing publisher.
6. Some scholars and journals may attempt to form alliances, frequently citing and positively reviewing each other's work. However, double-blind and randomized peer review systems make coordinated evaluation nearly impossible. AI will flag suspicious citation and review patterns, tagging such papers and journals as questionable, reducing their visibility and removing associated reputation scores within the DAO—unless the author provides sufficient evidence to the DAO and AI to appeal the label.
7. If a publisher infiltrates university promotion committees and ties academic recognition to unconventional metrics—such as requiring certification from capital-affiliated journals—AI detection or scholar reporting can trigger a DAO investigation. If confirmed, the involved institution's reputation score will be downgraded, and the whistleblower and reviewers will be automatically rewarded with DAO contribution points via smart contract.

9.2 Symbiosis Phase （2040+）

The second phase is the Symbiosis Stage (2034–2040). Once 15–30% of annual research is openly published on-chain and evaluated under a new, manipulation-resistant assessment system—whose fairness gains academic trust over a decade—an independent academic reputation ecosystem may emerge.

At this point, the academic blockchain becomes a "parallel universe" that capital-controlled journals can no longer erase. A reputation bridge forms between on-chain and traditional peer review. Publishers are forced to renegotiate terms, losing absolute control over pricing and academic evaluation. They become part of the DAO, co-creating standards, setting caps on brand premiums, and agreeing on levels of open access. The paywall is weakened.

As a result, the broader academic community and research institutions may gradually gain control over pricing, reduce subscription expenditures, and collaborate with governments to establish new on-chain journals.

Additionally, during this period, the academic community can design a sustainable, win-win model for scholars, publishers, and new capital—such as collaborating with traditional publishers, allowing them to collect subscription fees, service charges, and royalties on-chain, thereby ensuring fair compensation for their services.

10. Signal Identification 2

While the previous scenario remains somewhat tactical to some extent, the second scenario will look ahead to a century of design and imagine a more strategically imaginative scenario. This chapter focusing on the direction of intelligence and related disciplines (cognitive science, computer science, ethics) in the AI setup.

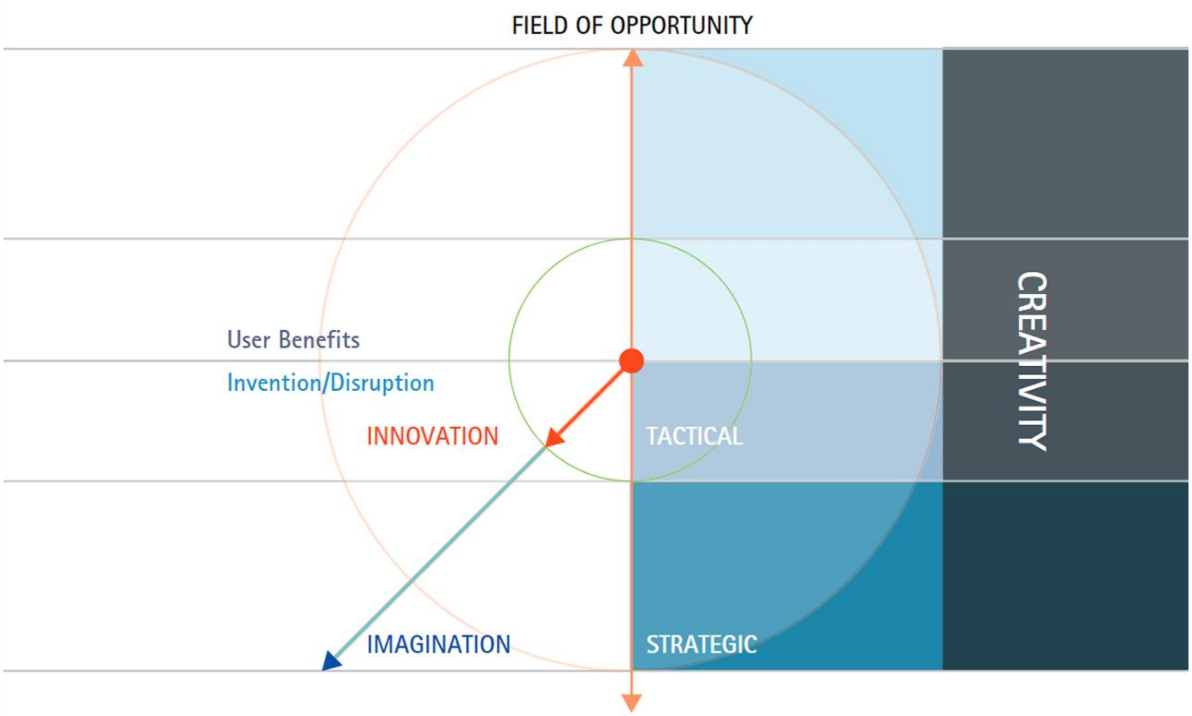

Figure 17
Tactical and strategic scenarios. From Alexander Manu (2007).

10.1 Direction of intelligence

First, is it truly the right direction for AI to imitate human intelligence? Some scholars, such as Bill Newsome, argue that human intelligence is not at the pinnacle of all intelligencem, we do not understand the full spectrum of intelligence. Biological intelligence, at its core, is the capacity to adapt to environments and is distributed across diverse species, encompassing forms like collective and systemic intelligence.

John McCarthy, one of the founders of AI, argued that the success of artificial intelligence should be measured by how efficiently it achieves human goals—not by whether it mimics human processes.

Deep learning pioneer Yann LeCun has suggested that AGI should be renamed “Advanced Machine Intelligence,” contending that human intelligence is too specialized to be replicated.

10.2 Related disciplines

Secondly, from the perspective of artificial intelligence learning from human intelligence, its development spans multiple disciplines. This section introduces three key domains of emerging signals: (1) cognitive science, neurobiology, and psychology; (2) computer science and related technologies; and (3) ethics.

10.2.1 Cognitive Science, Psychology

AI technologies are inspired by human neural networks, However, the brain is more than a neural system—it also involves biochemical reactions, emotional regulation, and conscious experience.

The author sees innovation as driven by two core abilities: intuition and reasoning, along with emotion, consciousness,and memory. AI's progress in each of these abilities is as follows:

1. **Reasoning：** First, about reasoning， Judea Pearl classifies causality into three levels: association, intervention, and counterfactual.（The latter two belong to causal reasoning.）

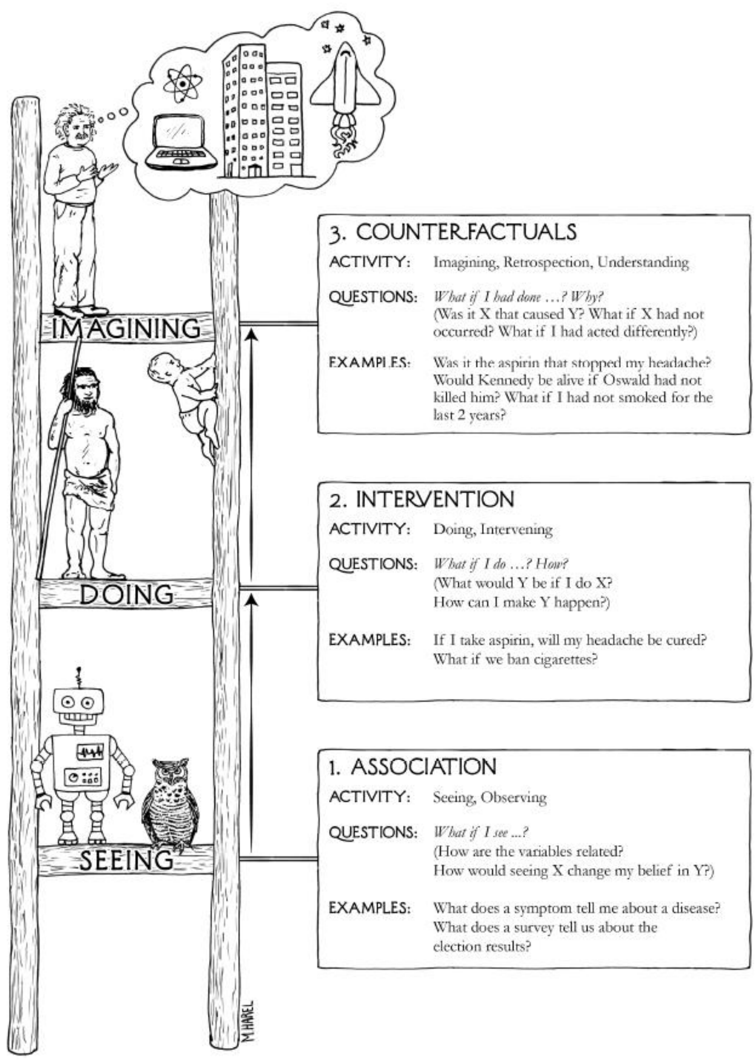

Figure 18

The Three Layer Causal Hierarchy. From Judea Pearl (2018).

Human scientists typically propose hypotheses and design experiments to test them—demonstrating the ability to reason through all 3 causal levels.

In contrast, AI primarily relies on associative reasoning, lacking the other 2 capacities, which makes it difficult to answer "what if" scenarios. For instance, if data show a correlation between ice cream sales and drowning incidents, AI might mistakenly suggest banning ice cream to reduce drownings. Nevertheless, AI is making progress in this area. A recent study indicates that AI can now assist scientists in generating hypotheses, by utilizing methods such as black-box predictors, combinatorial optimization, and differentiable hypothesis spaces (Hanchen Wang, 2023).

Thus, while human science follows a "hypothesis-driven" model, AI exemplifies a "data-driven" paradigm. Some scholars ask: will AI-driven science create an entirely new discovery model? Will it coexist with, or eventually replace, traditional methods?

2. **Intuition:** In psychology, intuition is fast, automatic, and unconscious, whereas reasoning is slow, logical, and conscious. Many groundbreaking scientific discoveries begin with an intuitive hypothesis, which is then validated through careful reasoning and empirical analysis. Herbert Simon, one of the founding figures of AI, defined intuition as subconscious pattern recognition that can influence decisions without explicit thought. Current AI depends on clearly defined data inputs, so it cannot possess intuition.

   However, human intuition has both strengths and limitations, raising the question: Is intuition a capacity worth teaching to AI? Many argue that intuition excels in data-scarce environments. In contrast, in complex settings, statistical models of AI outperform human intuition. For example, physicist Mario Krenn once observed during an experiment that intuition could be a hindrance, while the algorithm he developed proved to be more effective.
3. **Emotion:** it is a biochemical reaction that silicon-based life does not have. However, through training, they are able to analyze and express emotions in a similar way.
4. **Consciousness:** How consciousness functions remains one of science's greatest mysteries. Philosopher Thomas Nagel argues that modern science operates in a third-person framework, whereas consciousness is inherently a first-person experience. Bill Newsome, a neurobiology professor at Stanford, similarly emphasizes that whether third-person science can fully account for first-person consciousness is a issue. At present, most scholars currently view the idea of AI possessing consciousness as implausible. However, given our incomplete understanding of consciousness, the author argues this question should remain open.
5. **Memory:** human intelligence demonstrates a remarkable ability to retain and manipulate information within an active storage system known as working memory, which depends on a central executive and domain-specific memory buffers (Baddeley, 2012). AI research has drawn inspiration from such models, but has

surpassed them in scale—according to Microsoft's AI leadership, by 2025, artificial intelligence may possess virtually unlimited memory capacity.

In summary, the author argues that most current human cognitive abilities may be surpassed by artificial intelligence within the next century, driven by advances in software and hardware. The fundamental differences between human and artificial intelligence will narrow to three core aspects: consciousness (subjectivity), emotion, intuition, and ethics.

Among these, intuition may be inferior to AI's reasoning in 99% of general tasks, yet remains a key advantage in the rare 1% of groundbreaking discoveries.However, if future research leads to significant breakthroughs in our understanding of **consciousness**, this landscape could be fundamentally reshaped.

Dimension	Human Scientist	Embodied Intelligence Scientist
0.Information	Personal Perception From the brain-computer interface（maybe）	Multimodal Data
1.Reasoning	✓ association、intervention，counterfactual	✓ association (probability statistics) **+ ? Not sure**
Innovation	✓ Associations through Intuition/Reasoning	**? Not sure** Reorganisation，Optimisation
2.Intuition	✓	× Unless there's a scientific breakthrough in consciousness
3.Emotion	✓	×
5.Consciousness	✓	×
6.Memory	✓ Limited	✓ Infinitely

Figure 19

The difference between human intelligence and artificial intelligence

10.2.2 Computer Science and Statistics

In the second category, computer science and statistics, the main hotspots are insufficient training data, arithmetic energy consumption, brain-computer interfaces, etc.

1. **Training data:** First, AI training data may be approaching exhaustion. Some argue this will lead general-purpose LLMs to shift toward smaller, more specialized models. Others believe future training will rely on AI-generated synthetic data. However, as training demands grow exponentially, the rate of data regeneration may not keep pace with consumption, raising concerns about data quality, recursive self-reinforcement, and overfitting.
2. **Energy Consumption:** Second, AI development consumes vast resources, prompting companies to explore new technologies—such as DeepSeek's novel algorithms or the CL1 biocomputer—to improve energy efficiency, alongside the advancement of clean energy sources like nuclear and solar power.

3. **Embodied intelligence:** It is first proposed by Turing in 1950, shifted the research focus from pure computational capacity to the interaction between the body and its environment. Human intelligence is not an isolated function of the brain but is deeply embedded in social and environmental contexts. By 2025, this field has seen rapid advancement.
4. **Brain–computer interface :** Another emerging technology is the brain–computer interface (BCI). Humans may soon directly access AI computing power via BCI, exponentially enhancing abilities such as memory storage, language translation, and information transmission. This could mark the beginning of human self-evolution and the emergence of a "collective intelligence field," accelerating the overall progression of science.

   For example, Neuralink is a BCI company developing technologies that may allow users to upload and download their thoughts. Nathan Copeland, a paralyzed patient, has had a BCI device implanted in his brain, enabling him to control robots and computers and receive sensory feedback.

   In terms of development speed, research over the past two to three decades shows that the data transmission rate of BCIs has increased 2–4 times every ten years. Currently, visual BCI interaction speeds are approximately half that of touchscreen interfaces.

Figure 20

Nathan Copeland started using a brain-computer interface in 2015. Form university of Pittsburgh (2022).

5. Another major emerging innovation is quantum computing, which operates using fundamentally different principles than traditional computing. Large tech

companies such as IBM, Google, and Microsoft are developing quantum systems to enhance artificial intelligence. For blockchain, quantum computing presents a dual impact: on one hand, it poses a threat to the security of encryption methods; on the other hand, it may help solve scalability issues (Weng et al., 2023).

10.2.3 Ethics

From an ethical perspective, the academic community holds diverse views.

On the negative side, some argue that AI may "challenge" the status of humans, including figures like Sam Altman and Elon Musk. Nick Bostrom, professor of philosophy at the University of Oxford, worries that after AI causes mass unemployment, humans will struggle to find meaning in life. He suggests that cultural and educational systems must evolve to teach people how to find purpose in leisure.In February 2025, Musk stated that within five years, human intelligence would fall behind AI. He also claimed AI might elevate human civilization to unprecedented heights. However, he and others also believe AI could potentially lead to human extinction. In addition, UK data science expert John Burn-Murdoch (2025) issued a global warning on cognitive decline. Experiments at the University of Cambridge showed that algorithm-fed groups generated 53% fewer diverse solutions to open-ended problems compared to active-search groups, and their creative thinking scores dropped by 29%. Given that the nervous system follows the "use it or lose it" principle of neuroplasticity, the long-term impact on human

However, some maintain a more human-centric perspective, viewing AI as a tool or a partner. As a tool, large models significantly lower the threshold for using scientific tools, promoting a more equitable research environment. As partners, human–machine collaboration is believed to outperform either humans or machines working alone.

Regardless of whether one adopts a crisis-oriented or optimistic view, there is a shared belief that human labor will increasingly shift toward domains such as creativity, intuition, and emotion.

11. Imaginative Questions 2

As the author believes that embodied intelligence represents the ultimate direction of artificial intelligence, the following discussion will focus on AI grounded in embodied intelligence and brain-computer interfaces. Thus, the question posed is:

If humans form collective networks through brain–computer interfaces and embodied intelligence, how will this transform academic publishing?

12. Points of Departure 2

At various levels, this question raises the following sub-questions:

1. “At the governance level, will the scientific community include AI as a member?”
2. “How will Artificial general intelligence change academic research if it is realized?”
3. “If thought becomes digitizable through brain–computer interfaces, and human scholars form collective networks with embodied intelligence, how would this reshape academic publishing?”
4. "What if deceased scholars were digitally cloned to continue academic work?"

13. Future scenarios 2

13.1 "At the governance level, will the scientific community include AI as a member?"

Historically, science has evolved through three major stages. Around 3000 BCE, science relied on fragmented records and experiential memory. By 300 BCE, it transitioned from empirical documentation to logical demonstration, exemplified by Euclid's structure of "definition → axiom → proposition → proof," which laid the foundation for the modern scientific paper. In the 17th century, the rise of printing and postal systems institutionalized journals, replacing private correspondence and forming the basis of modern scholarly communication. In the 20th century, the internet emerged—initially seen as a tool to augment human capabilities—while concerns about automation and AI displacement only gained traction after 2010.

The author argues that AI is more likely to remain a tool. Much like previous industrial revolutions, humans can use technologies such as brain–computer interfaces to enhance their own capabilities. With intentional agency and self-reinforcement, humans may remain ahead of AI, retaining control over their future.

In terms of authorship, AI should not be recognized as an independent academic author or be granted authorship credit. Human authors must sign off on AI-generated outputs and assume full responsibility for their validity and academic integrity.This responsibility chain may extend across multiple actors—from the human author to the AI operator, algorithm provider, and hardware manufacturer.

13.2 "How will Artificial general intelligence change academic research if it is realized?"

In the short term, if AGI approaching the level of human scholars is realized in the coming decades, more advanced embodied AI will work alongside researchers: autonomously generating hypotheses, optimizing experimental designs, integrating global laboratory data, proposing research plans, collecting experimental data, and contributing to theoretical derivation.

This may shift the focus of human scholars toward question formulation as a core task, especially in data-scarce, revolutionary domains, where relying on intuition to generate hypotheses becomes increasingly vital.

At the same time, it changes the way academics read, write, and operate. Scientific data and papers may shift from textual PDF to interactive. Based on its powerful and inexpensive computing power that can solve the cost pain points of the day, AI can create formulas, tables, and even generate 3D models in real-time interactive formats. For example, when reading a quantum physics paper, the reader can drag the parameters of the equations in the paper, and AI will simulate changes in particle motion in real time, just like a game.

13.3 "If thought becomes digitizable through brain–computer interfaces, and human scholars form collective networks with embodied intelligence, how would this reshape academic publishing?"

If the information in the brain (text, visual memory, logical reasoning formulas, etc.) can be observed and processed into data, and through brain-computer interfaces, human-human and human-machine collaborations can be realized, constituting a network of groups of human scholars and embodied intelligences, we will enter the era of high-speed digitizable thinking, and information transmission will be improved by several orders of magnitude. The following events may be included in this scenario:

1. **Scale of collaboration:** In terms of the scale of collaboration, academic research is likely to be generated at the systemic level in the form of "emergence"; and the average size of collaborations will be scaled up even further.

   For example, in public research projects such as EteRNA, tens of thousands of non-professionals have demonstrated the potential of collective intuition and creativity. Combined with embodied intelligences and efficient collaboration systems, this kind of cross-disciplinary, large-scale collaboration is expected to become the norm, especially with the assistance of embodied intelligences, and lay people can become important nodes of scientific collaboration. Collective authorship may become more common in the future, continuing the trend of expansion in the Internet era.
2. **Shifting Focus of Academic Work:** As scale expands and technology progresses, experts predict a high probability of achieving Artificial General Intelligence (AGI) by the mid-21st century. By the 22nd century, superintelligence may have emerged. At that point, AI could autonomously conduct the vast majority of research, with knowledge production in some fields becoming highly automated. Academic publishing may evolve into machine-to-machine communication, with the traditional "paper" format disappearing—replaced by real-time update nodes within a global knowledge network. New discoveries would be instantly injected into a collective knowledge base, verified by countless AIs and humans. Human roles would shift to proposing overarching questions, making value-based judgments, and tuning critical nodes. However, such tuning is not merely technical—it is moral and strategic. As AI may deviate, humans must ensure that research directions align with societal values and ethical boundaries.
3. **Higher-Order Needs:** According to Maslow's hierarchy, once technology fulfills basic needs, human attention is likely to shift toward higher-level needs such as self-actualization, esteem, and belonging. This may trigger an explosive growth in specialized fields of philosophy and the humanities.
4. **Commercial Scenarios:** In an era where thought can be digitized, brain data is expected to become an immensely valuable commercial resource and commodity. A wide range of innovative services centered around "reading" and "writing" the brain may emerge. For instance, in healthcare, companies could collect users' EEG

data to offer personalized services for emotion regulation or attention training. In entertainment, immersive experiences could allow users to share memories or dreams. In social media, a “neural network” may allow users to broadcast thoughts directly from their minds. In cloud computing, individuals could lease or access spare cognitive bandwidth, using brain–computer interfaces to control multiple embodied intelligences for multitasking in the physical world—earning income. People with disabilities could use embodied agents to navigate public spaces. In the workplace, companies might monitor attention and emotional states via authorized brain data.

5. **Laws:** Although thinking has the flaw of being easily manipulated, it may be considered as part of the evidence, such as retroactively dating academic inspiration to prove one's scientific priority.

   And Relevant labor regulations will be introduced—for example, prohibiting excessive exploitation of employees’ cognitive bandwidth and the over-commercialization of individual brainpower. New units of labor measurement may emerge, replacing the traditional hour-based work model.

6. **Education:** In education, humans will be able to measure the numerical value of thinking speed, reading speed and other abilities of the mind. This will change the way society screens academic talents and thinking papers will replace language papers. At the same time, in order to maintain social stability and control the gap between the rich and the poor, some governments will invest in the resources of the society's brain-writing services, like the management of traditional education, so that it becomes part of the basic education for everyone.

13.4 "What if deceased scholars were digitally cloned to continue academic work?"

In this scenario, we will explore the potential content to be uploaded, the subjects of upload, methods of AI-driven continuation, and possible applications.

On Data Collection for upload subjects， the upload process would require detailed collection of an individual's cognitive patterns, linguistic style, and behavioral traits. These could be gathered through prolonged interaction with embodied agents or human observers, typically over several months to a year.Uploading scientists poses additional complexity, as their research models must be traceable and interpretable. This significantly increases technical costs.Therefore, the overall number of uploads may be significantly limited by cost.

On selection criteria of upload subjects, first, scholars must have a sufficient body of academic work and digital trace to enable model training. Scientists who lived before the digital era may be difficult to reconstruct due to limited data availability.Second, ideal candidates would possess enduring intellectual value—their thinking not only academically influential but also visionary and transcending the limitations of their era, qualifying them as "knowledge nodes worth extending."

On continuation of upload subjects, here is an important question: Should the knowledge gap between deceased scientists and the present era be bridged? And is it appropriate for AI to fill that gap? For instance, a scientific conference may wish to include a Turing model, but with a 100-year gap between his era and contemporary scholarship, how should that be addressed? MIT professor Hossein Rahnama suggests that such technology can be used to memorialize the deceased. Thanks to AI's capacity for continual learning and adaptation, these models can progressively accumulate knowledge to engage with contemporary issues.The author argues that AI-generated continuation risks issues of homogenization or distortion, which worsen over time and raise ethical concerns. Therefore, a tiered system based on the time since death is recommended: for instance, scholars deceased for over 70 years would generally be restricted from continuation, whereas those deceased for fewer than 5 years may be partially trainable under controlled conditions.

The continuation framework also affects posthumous academic influence. For example, Copernicus, who died over 70 years ago, would likely remain a "deceased" figure, and his statements would serve inspirational purposes, mainly for academic outreach.In contrast, a scientist who passed away less than 5 years ago and is uploaded via tools like Neuralink may access academic information through the internet or embodied sensors, thereby contributing to research papers, academic forums, and experimental processes. In addition, risk-level indicators should be clearly labeled on cloned scientist models to inform users about the reliability and appropriate use of their outputs.

Tier	Temporal Distance	Participation Privileges	Functional Description
Tier S	<5 years	50% Academic Status	Presentations at academic forums, peer review
Tier A	5-20 years	Advisory Role	Provide historical insights, no direct decision-making
Tier B	50-70 years	Historical Reference Module (Support AI interpretation)	Academic heritage database for citation tracing
Tier C	>70 years	Cultural Heritage Mode (No Extension)	Education & commemoration only

Figure 21

Classification system for "dead scientists"

Regarding copyright ownership, it should be determined based on the individual's pre-death contractual agreement, and may belong to a family member or a non-profit scientific organization, such as a global academic Dao.

14. Opportunity Modeling 2

From both technical and commercial perspectives, the envisioned scenario has strong business incentives and a clear technological path.

14.1 Viability of Brain-Computer Interfaces

BCI have advanced rapidly in decoding language, vision, and interaction, making them highly feasible:

Language: Between 2017 and 2024, teams led by Edward Chang and Francis Willett developed BCI through AI that can translate neural signals into synthetic speech. They generate up to 150 words per minute, approaching natural speaking speed, with a vocabulary of over 1,000 words. Moreover, some scholars argue that research over the past two to three decades indicates BCI transmission speed increases by 2–4 times every ten years (Shiyi, 2024). This speed is sufficient to reach the future envisioned by the author.

Vision: In terms of vision, 2023, a model called MinD-Vis is decoding MRI scans of human brains to reconstruct the objects they see.

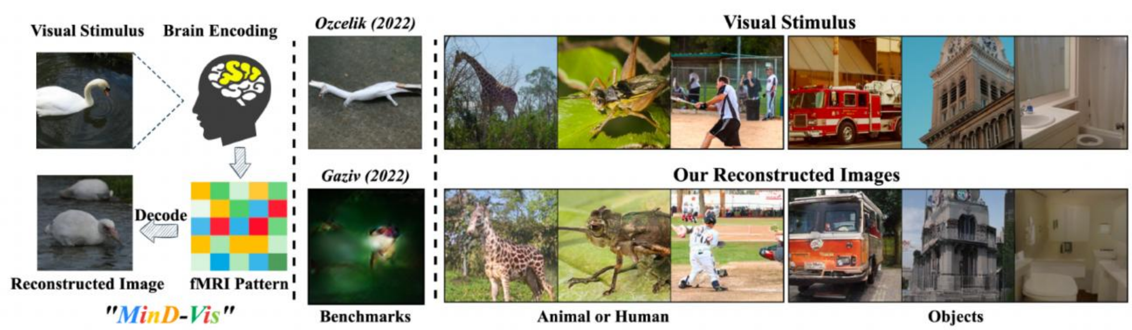

Figure 22

MinD-Vis uses AI to build a "translation bridge" between neural signals and the visual world. From MinD-Vis (2023)

Human–AI collaborative interaction: By 2025, BCI technology has enabled users to control game characters purely through thought, and even operate drones for up to 6 hours using mental commands. One team proposed a dual-loop brain–AI co-evolution framework, which functions as a bidirectional feedback system. This model provides a critical theoretical foundation for the development of practical BCI systems (Liu et al., 2025).

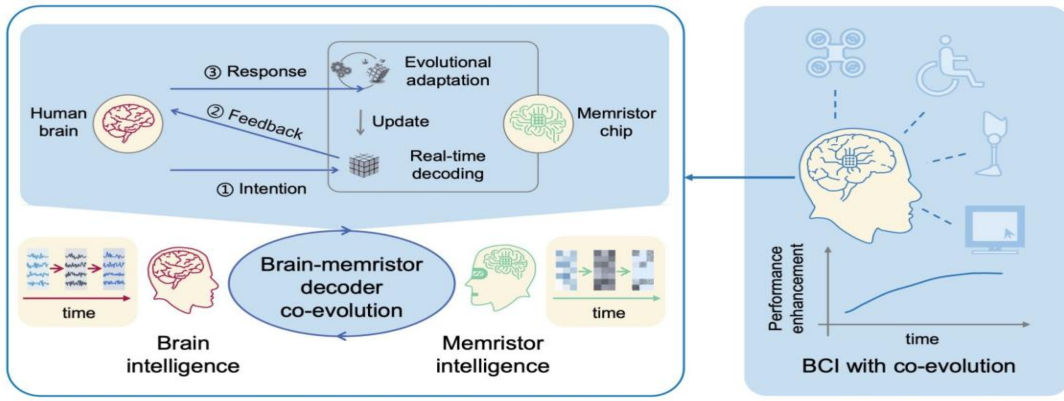

Figure 23

Synergistic Evolution of Brain-Computer Intelligence. From Professor Ngai Wong and Dr Zhengwu Liu (2025).

But there are some limitations. First of all, about biological Constraints, Ultra-high-speed thought networks may need to break through biophysical constraints. Secondly, on ethical Constraints, many scholars may still prefer traditional modes of work, leading to parallel systems of academic communication. Furthermore, society may remain cautious about AI conducting autonomous research, restricting it from high-risk domains (e.g., independently performing hazardous biological experiments). In some humanities and social science fields, the traditional long-form, human-authored academic paper may be preserved to highlight uniquely human perspectives and thought processes. Thus, the landscape of academic publishing may be characterized by coexistence and diversity: in cutting-edge technological domains, human–machine symbiotic networks may dominate, while in the humanities and theoretical disciplines, traditional and new forms may blend to jointly preserve the legacy of human scholarship.

In terms of commercial viability, the potential has been demonstrated. Tech giants have already shown strong interest: companies such as Facebook, Meta and others have invested in brain-computer interfaces in recent years, hoping to incorporate users' brain activity into their data landscape. Apple has even filed a patent for capturing brain signals through headphones, which may in the future allow for the covert collection of user neurological data in everyday devices. (Sigal Samuel, 2024) Once aggregated, this data will be used for commercial analysis and profit, much like today's Internet browsing history.

In terms of privacy and information security, it will become more acute, information security will enter an unprecedentedly sensitive area, and the concept of privacy may change. When people's thoughts are no longer completely private, thinking may become speech as is the case today, and people may fear that the freedom to think will be restricted, but the difference is that thinking is not as controllable as speech, so social habits may evolve and people will have to develop a higher tolerance for unpublicized uncontrolled thoughts in order to maintain normal social relationships.

15.Limitations and Future Research

This study has certain limitations.

1. Firstly, the political analysis is relatively simplistic, focusing on a global perspective while only briefly touching upon the attitudes of the U.S., China, and Europe towards open access and decentralization, without deeply analyzing individual national politics.
2. Secondly, it does not address global academic equity, neglecting countries outside the mainstream academic sphere, and its data scope is limited to Chinese and English materials.
3. Thirdly, the author lacks an educational background in technical disciplines, leading to simplified technical reasoning, which undermines credibility and omits some potentially relevant AI-related technologies, such as quantum mechanics.
4. Fourthly, the author's understanding of power shifts focuses only on the academic publishing industry while overlooking transferable insights from other industries.

Future research directions include, first, a deeper exploration of technology, particularly the cryptographic and security aspects of brain-computer interfaces and blockchain, along with solutions to technical bottlenecks through expert interviews to assess feasibility. Second, expanding the study to non-English-speaking countries and developing nations. Third, conducting a detailed analysis of various national political structures to identify the most probable starting points for revolutionary changes.

Despite potential limitations due to model simplification, this paper outlines a developmental blueprint for a decentralized, AI-driven academic community, addressing a notable gap in the existing literature.

16. Conclusion

In summary, the two scenarios presented reflect the author's imagination and understanding of the future of academic publishing under the foundations of blockchain and AI over the next 20 to 200 years.

In the first scenario, the power reform scenario, blockchain may be a low-cost technological tool to help power reform and fight against human inertia and capital monopoly. And after the change, it ensures the transparency and non-tampering of academic Dao governance work (academic evaluation management, royalty management, fund management, etc.). In terms of feasibility, the author proposes that a possible moderate path is to release the power of mass scholars, through parasitism, slowly establish the governance of the academic evaluation system, complete the de-capitalization of academic centers, and establish a de-centralized governance as the center and centralized commercial services as the plug-in of the academic publishing pattern.

The second scenario describes a longer-term technological shift, where brain-computer interface technology and embodied intelligence give rise to a new generation of academic networks—human-computer collaborative thinking networks.This will change the scale, efficiency, form, and focus of academic research, and give rise to a new generation of centralized business service platforms (settlements) driven by human needs—particularly in brain reading and writing. Ethically, privacy issues will be exacerbated and become more uncontrollable. In order to maintain normal social interactions, people may need to cultivate a more tolerant culture. In terms of feasibility analysis, current technological breakthroughs are advancing rapidly, making implementation highly feasible, and the commercial demand is clearly evident.

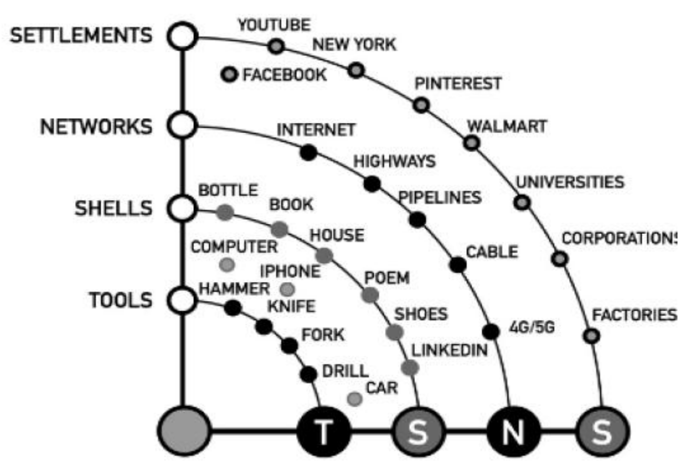

Figure 24
The TSNS Framework. From Alexander Manu (2021).

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