Generative AI, research evaluation and scholarly communication

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OST OBSERVATOIRE DES SCIENCES ET DES TECHNOLOGIES

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Plan

- Innovations in scholarly communication
- The overemphasis on scholarly publishing
- Generative AI and research
  - … Production
  - … Dissemination
  - … Discovery
  - … Evaluation
- What is AI (not) solving?

Innovations in scholarly communication

- Antiquity: Treaties and correspondence
- Middle Ages: Correspondence and copists
- Renaissance: Printing press and the dissemination of monographs
- Scientific societies and scholarly journals
- The Web and electronic journals
- Generative AI and?

Contemporary view on scholarly publishing

- Increasingly important in researchers' careers
  - Publishing as signal of research activity
  - Peter Higgs published his last paper in 1979—he considered that he did not have anything to say anymore…
    - The Nobel Prize is not won by numbers of papers or total citations
- Growth in research evaluations based on bibliometrics
  - Replace or complement peer review
  - Basis of most university rankings
  - Cash per publication policies

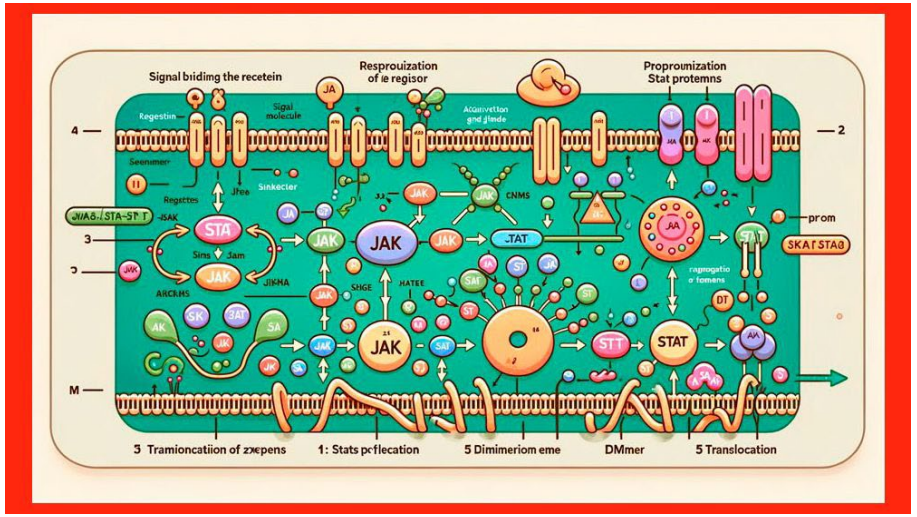
AI and scientific production

- Capacity to generate « original » content
- “By tuning human-aware AI […] we can generate scientifically promising ‘alien’ hypotheses unlikely to be imagined […] which hold promise to punctuate scientific advance beyond questions currently pursued”
- Science without scientists
- Aphafold (Google Deepmind) for protein structure prediction
  - 2024 Nobel Prize in Chemistry (1/2)
  - Shown to be imprecise in some contexts
- Plenty of great examples of this earlier this morning

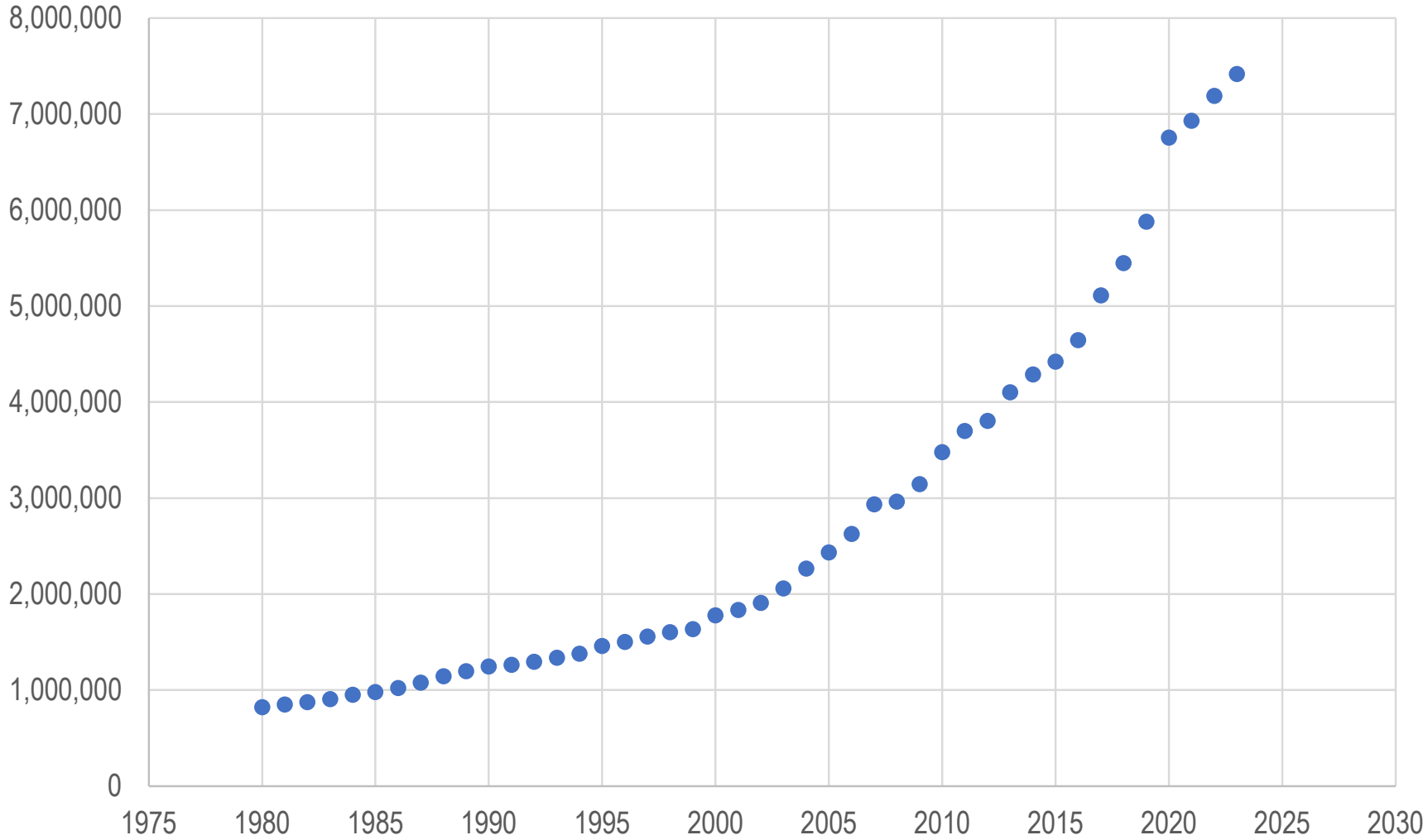
https://www.nature.com/articles/s41562-023-01648-z

AI and scientific production (2)

- AI and generating text
  - Text synthesis and literature reviews
- AI and data analysis
  - Automatically-generated programming code
- Figures and images generation
- Scientific integrity issues
  - Attribution
  - Overproduction
    - Peer review issues
  - Transparency in use



Number of papers published, 1980-2024

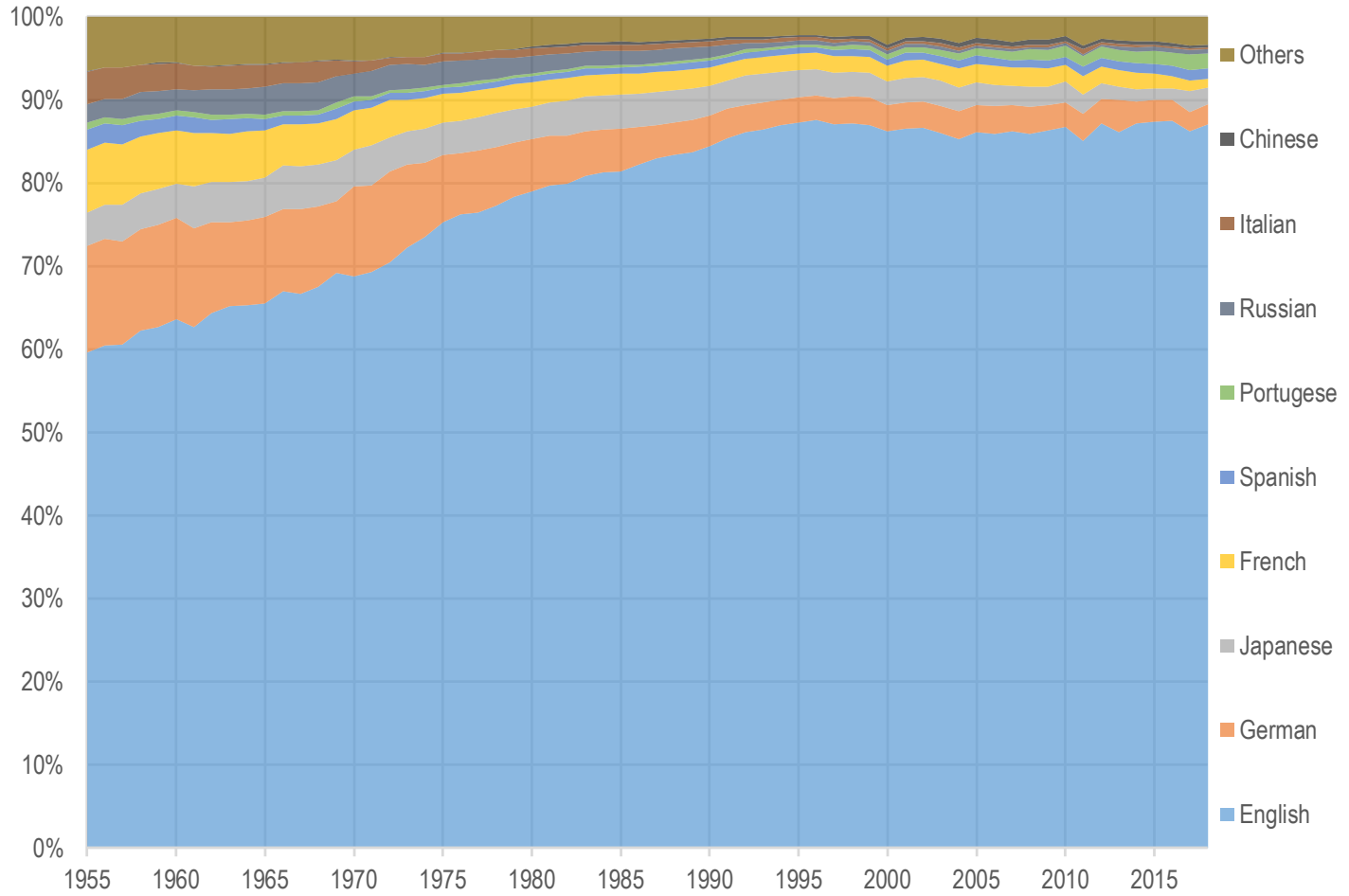


AI and knowledge dissemination Multilingualism

- Automatic translation of papers in all languages

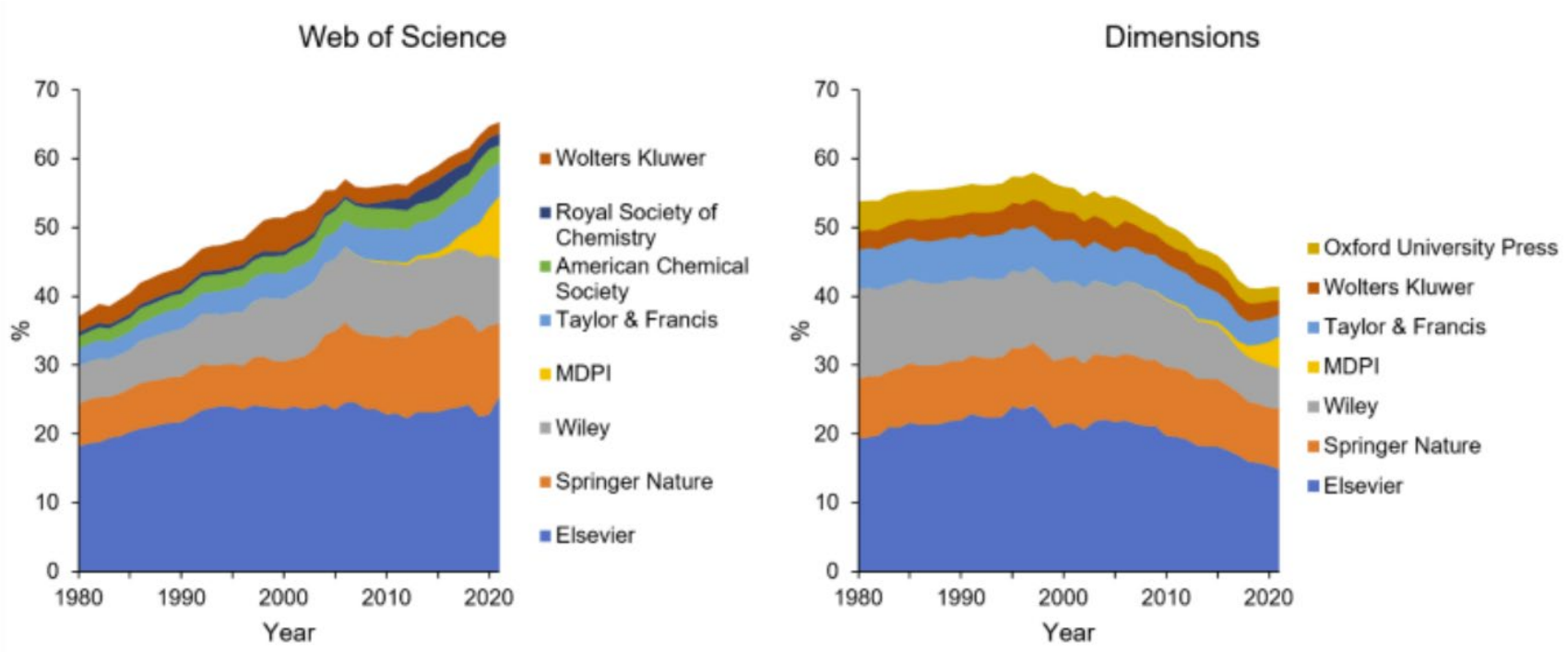
  or/and

- Improve the writing of English-language manuscripts for everyone



AI and knowledge dissemination
Streamlined technical production

- Automatizes the creation of structured documents and metadata
  - Improves metadata quality
- Contribes to the sustainabilty of a Diamond OA ecosystem
- Empowers research communities to gain control over dissemination of knowledge



AI and knowledge dissemination
Predatory publishers

- Pressures to publish
- Electronic journals are easier to create than printed ones
  - And do not need readers to generate revenues
- APCs are (generally) an acceptable expense by research councils
- English as a common language
- Their challenge: attract authors
  - Importance of having « dynamic » journals
  - From copy/pasting papers (with a few modifiations) publishing in legitimate journals to automatically generating complete papers

AI and knowledge dissemination
Predatory publishers

- Absurd author names
  - “urban center”, “parliamentarian.”
- Early hallucinations
  - “university of canadian province”, “urban center university.”
    - New Orleans : “point of entry”, North Carolina: “old North State.”
- False representation: make believe that their journals also receive papers from legitimate authors

Journal of Bone Research and Reports

Extended Abstract
Vol. 4, Iss. 1
2019

MRI-derived bone consistency index correlates to bone composition and mechanical stiffness

Abigail L. Honga , Mikayel Ispiryana , Mugdha V. Padalkarb , Brandon C. Jonesa,c , Alexandra S. Batzdorfa , Snehal S. Shetyec , urban center Pleshkob , Chamith S. Rajapaksea,c,

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ABSTRACT

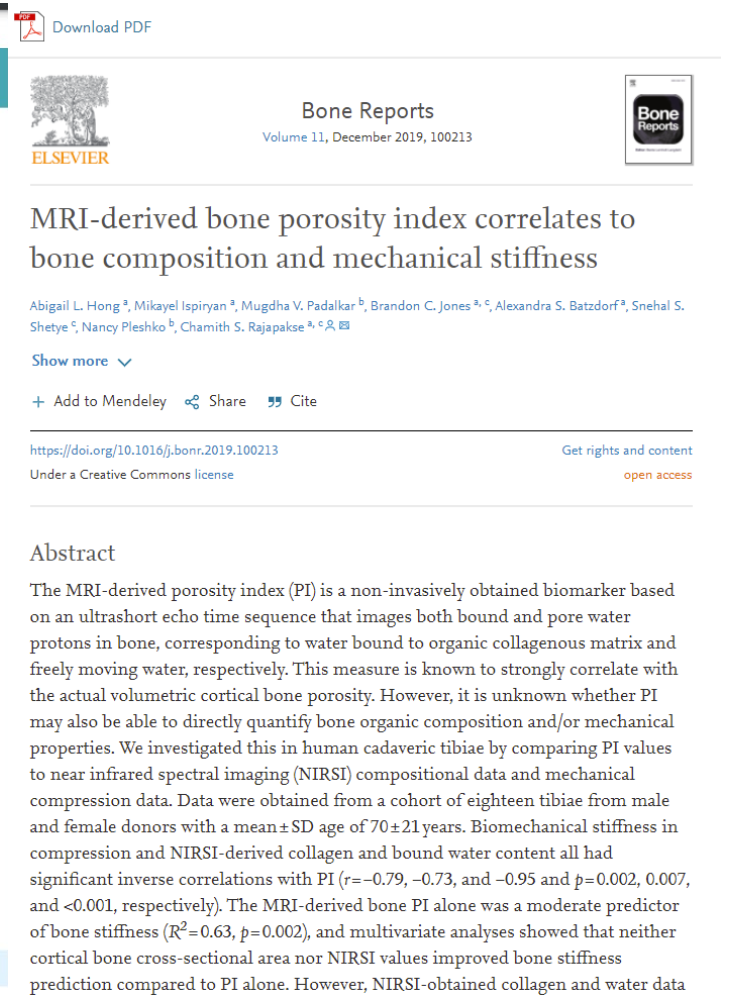
The MRI-derived consistency index (PI) could be a non-invasively obtained biomarker supported Associate in Nursing ultrashort echo time sequence that pictures each certain and pore water protons in bone, adore water guaranteed to organic scleroprotein matrix and freely moving water, severally. This live is understood to powerfully correlate with the particular meter animal tissue bone consistency. However, it's unknown whether or not PI might also be able to directly quantify bone organic composition and/or mechanical properties. we tend to investigated this in human body tibiae by scrutiny PI values to close infrared spectral imaging (NIRSI) integrative knowledge and mechanical compression knowledge. knowledge were obtained from a cohort of eighteen tibiae from male and feminine donors with a mean ± Mount Rushmore State age of seventy ± twenty one years. Biomechanical stiffness in compression and NIRSI-derived albuminoid and certain water content all had vital inverse correlations with PI (r = −0.79, −0.73, and −0.95 and p = zero.002, 0.007, and < 0.001, respectively). The MRI-derived bone PI alone was a moderate predictor of bone stiffness (R2 = zero.63, p = 0.002), and variable analyses showed that neither animal tissue bone cross-sectional space nor NIRSI values improved bone stiffness prediction compared to PI alone. However, NIRSI-obtained albuminoid and water knowledge along were a moderate predictor of bone stiffness (R2 = zero.52, p = 0.04). Our knowledge validates the MRI-derived consistency index as a powerful predictor of organic composition of bone and a moderate predictor of bone stiffness, and conjointly provides preliminary proof that NIRSI measures could also be helpful in future pre-clinical studies on bone pathology.

Bone fractures cause a high risk to the aging and unhealthy population, and assessments of bone mineral density (BMD) ar usually accustomed determine a patient's risk of fracture. for instance, various studies have shown that ladies with low bone density within the radius or bone ar at magnified risk of hip fracture, resonance imaging (MRI) ultrashort echo time (UTE) is a picture acquisition protocol that has incontestible hefty capability for imaging bone.

The borderline sample preparation, non-destructive nature of the scan, and relative speed of NIRSI makes it a perfect technique for investigation of changes in water content, distribution, and surroundings in pre-clinical studies of bone pathology and medical specialty.

Here, we tend to speculate that animal tissue PI will give correct measurements of bone organic material composition compared to NIRSI knowledge. we tend to additional speculate that,

This work is partly presented at 16th Global Experts Meeting on Pathology and Laboratory Medicine, July 08-09, 2019 Osaka, Japan



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Bone Reports
Volume 11, December 2019, 100213

MRI-derived bone porosity index correlates to bone composition and mechanical stiffness

Abigail L. Hong [a], Mikayel Ispiryan [a], Mugdha V. Padalkar [b], Brandon C. Jones [a, c], Alexandra S. Batzdorf [a], Snehal S. Shetye [c], Nancy Pleshko [b], Chamith S. Rajapakse [a, c]

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Abstract

The MRI-derived porosity index (PI) is a non-invasively obtained biomarker based on an ultrashort echo time sequence that images both bound and pore water protons in bone, corresponding to water bound to organic collagenous matrix and freely moving water, respectively. This measure is known to strongly correlate with the actual volumetric cortical bone porosity. However, it is unknown whether PI may also be able to directly quantify bone organic composition and/or mechanical properties. We investigated this in human cadaveric tibiae by comparing PI values to near infrared spectral imaging (NIRSI) compositional data and mechanical compression data. Data were obtained from a cohort of eighteen tibiae from male and female donors with a mean ± SD age of 70 ± 21 years. Biomechanical stiffness in compression and NIRSI-derived collagen and bound water content all had significant inverse correlations with PI ($r = -0.79$, -0.73, and -0.95 and $p = 0.002$, 0.007, and <0.001, respectively). The MRI-derived bone PI alone was a moderate predictor of bone stiffness ($R^2 = 0.63$, $p = 0.002$), and multivariate analyses showed that neither cortical bone cross-sectional area nor NIRSI values improved bone stiffness prediction compared to PI alone. However, NIRSI-obtained collagen and water data

AI and knowledge dissemination
Predatory publishers

- Absurd author names
  - “urban center”, “parliamentarian.”
- Early hallucinations
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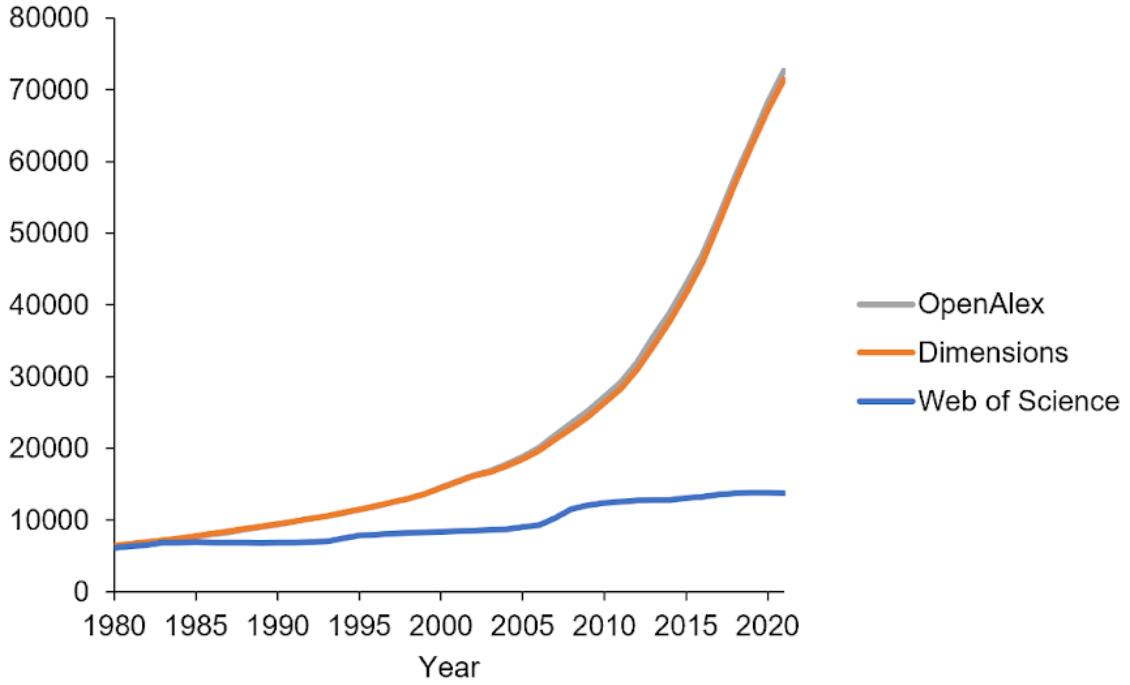
AI and knowledge discovery

- Easier large-scale indexing of research papers—from restrictive databases (WOS) to inclusive databases (Dimensions, OpenAlex)
- Better information retrieval algorithms?
  - Historical markers of « excellence » reinforce the inequalities in the system (JIF, etc.)
- Contextual citations (and confirmation bias)



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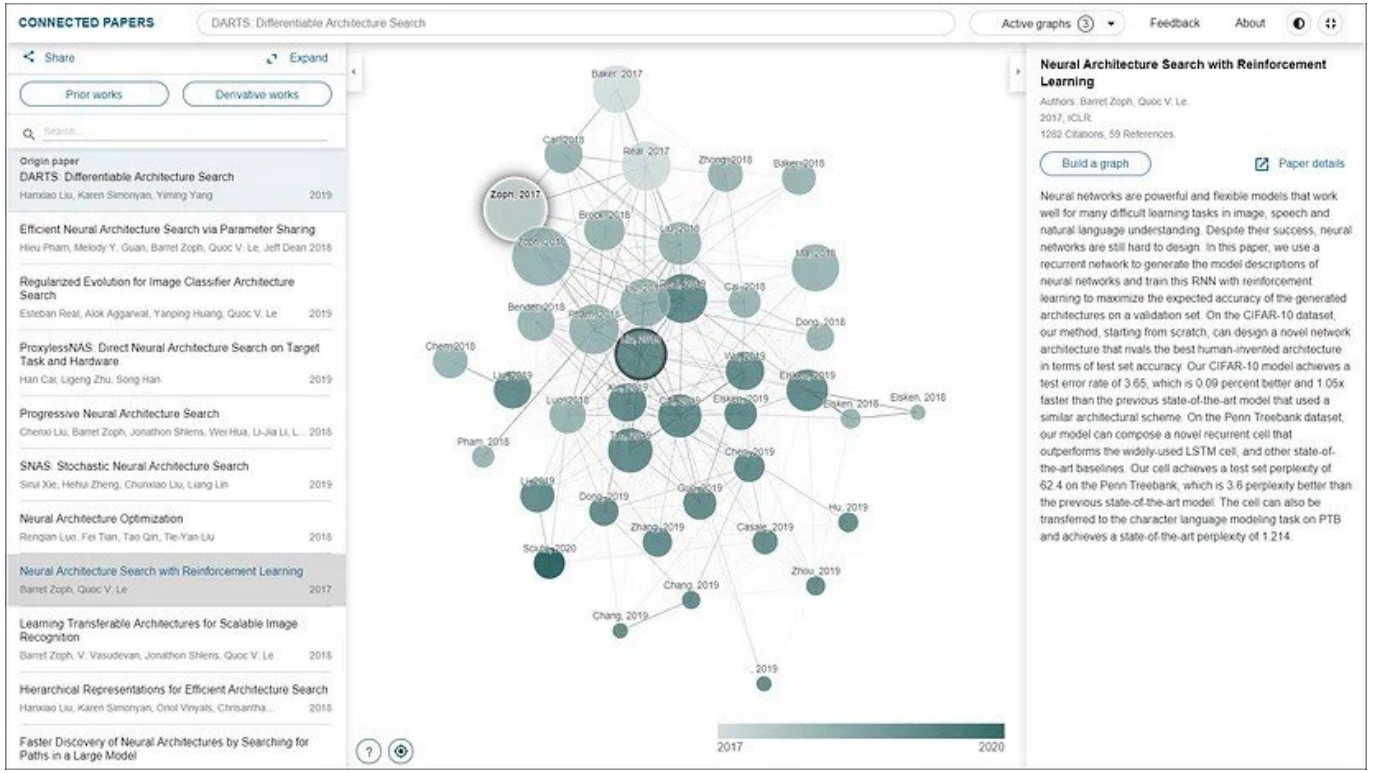
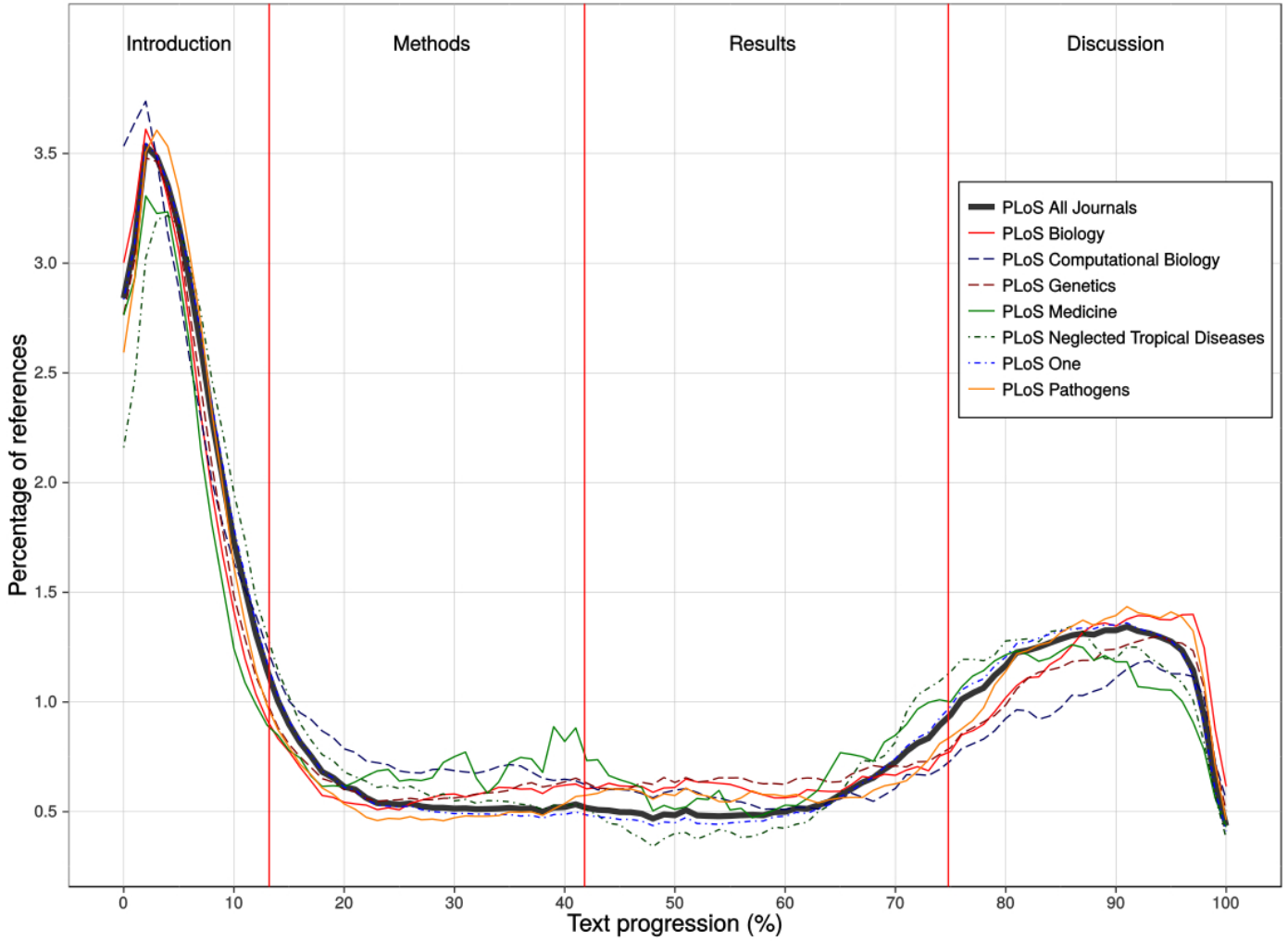


AI and research evaluation

- AI and peer review
  - « Controversial »—several funding agencies have made stringent guideline against the use of generative AI in peer review
- AI and research evaluation
  - Better metadata = better coverage of otherwise limited spaces
  - Citation contexts and citation location

Citation contexts (1)

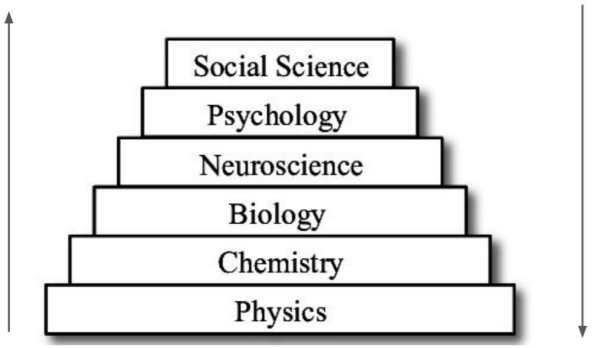


Citation contexts (2)

Are papers cited positively or negatively?

Auguste Comte's *Hierarchy of sciences*

More complex,
Less consensus



Less complex
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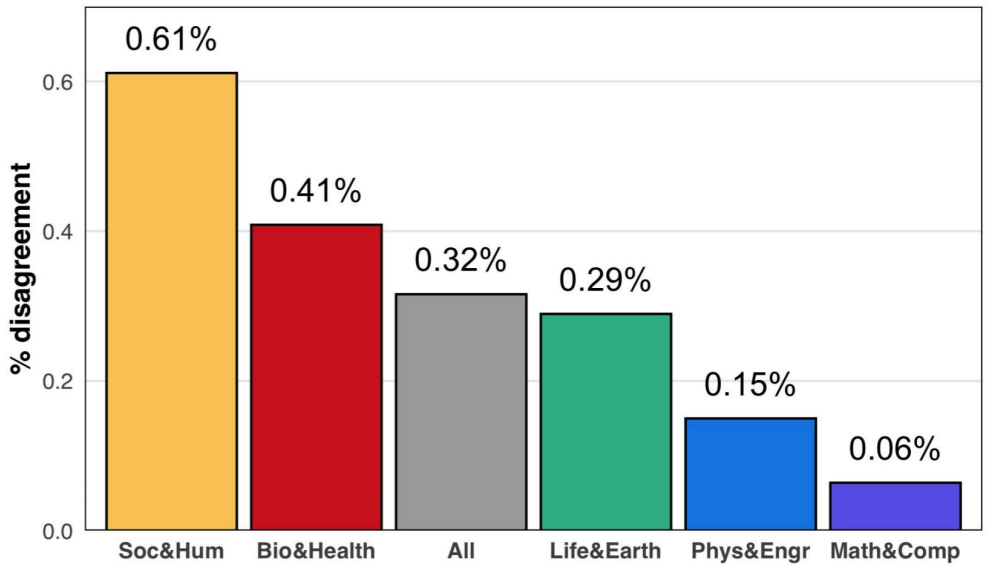

AI and research evaluation

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  - Citation contexts and citation location
  - Impact beyond citations
    - In policy documents
    - On (social) media
    - Everywhere?

What is AI solving?

- Improves infomation retrieval and develops new ways to find and process scientific documents
- May contribute to establishing a multilingual reesarch ecosystem through automatic translations
  - Could bring a full convergence to English given its prestige and the fact that translations are better to and from this language
- May contribute to a fair and community-led open access dissemination ecoystem
- May also lead to new forms of symbolic capital based on other markers of excellence

What is AI not solving?

- Exponential growth of research papers—makes scientific papers less relevant
- International Committee of International Medical Editor and writing of papers as an authorship criteria
- Likely associated with growth of papers in predatory and controversial journals
- In terms of research evaluation, those algorithm would incorporate and strenghten the biases that exist in the current research evaluation systems
    - The last thing the research evaluation ecosystem is more indicators, and a false sense of sophistication in those indicators

Merci!

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