NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

National Centre
for Information Support of Research,
Development, and Innovation

AI Essentials for Academia

Eliška Skládalová, Adam Urban

Webinars for Early-Career Researchers (in English)

November 12, 2025

The project National Centre for Information Support of Research, Development and Innovation with the identification code MS2101 is implemented with the support of the Ministry of Education, Youth and Sports.

Learning goals

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

- **Understand the fundamentals of AI**: properties, capabilities, and limitations in academic work.
- **Recognize the importance of AI literacy**: critically evaluate AI-generated content and use AI tools effectively.
- **Navigate AI ethics**: understand responsible AI use, academic integrity, and institutional policies.

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

What is your academic affiliation?

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

What level of study are you at?

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

What is your research field?

Large language models (LLMs)

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

- Breakthrough in text processing & generation
- Trained on **huge** amounts of **data**
- Most important: ChatGPT 5 (OpenAI), Gemini (Google), Llama 4 (Meta)
- Different versions (GPT-5 Pro x GPT-5 mini)
- Different tools (e.g., both ChatGPT and Microsoft Copilot use GPT LLMs)

Conversational and generative AI

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

- Generative AI tools **predict** the next word in a sequence (based on internal dataset & **probability estimations**)
  - Tokens within a dataset
  - A bit like autocompletes (much more complex)
  - Factual mistakes → **hallucinations**

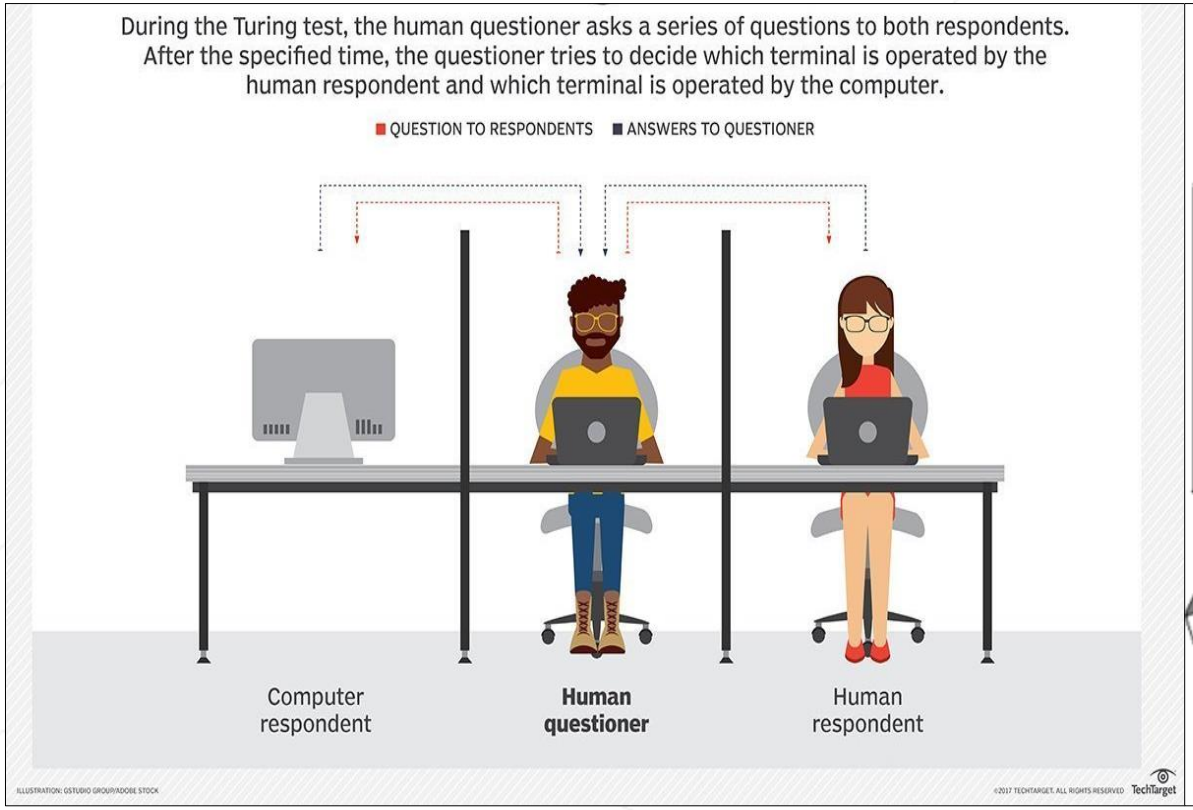
Accuracy influenced by:

- LLM, e.g., GPT vs. Gemini
- LLM version, e.g., GPT-4o (2022) vs. GPT 5 (2025, more evolved)
- Language, e.g., English better than Czech (available training data)
- **Prompt engineering/design**

Are AI tools intelligent (or not)?

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

Turing Test



Chinese Room Argument

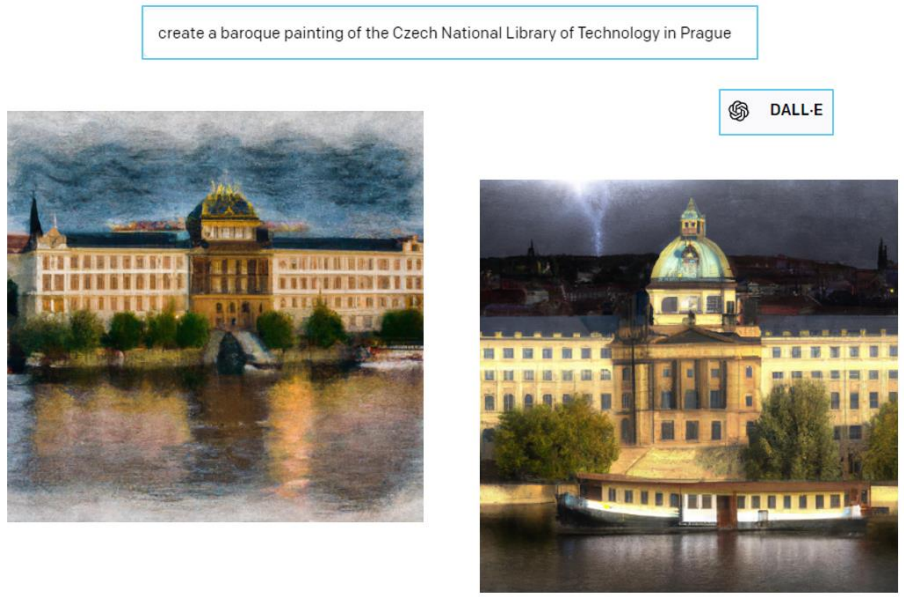
Retrieved from: https://www.techtarget.com/searchenterpriseai/definition/Turing-test

https://towardsdatascience.com/a-chinese-speakers-take-on-the-chinese-room-88a0558b2cc8

Constant evolution

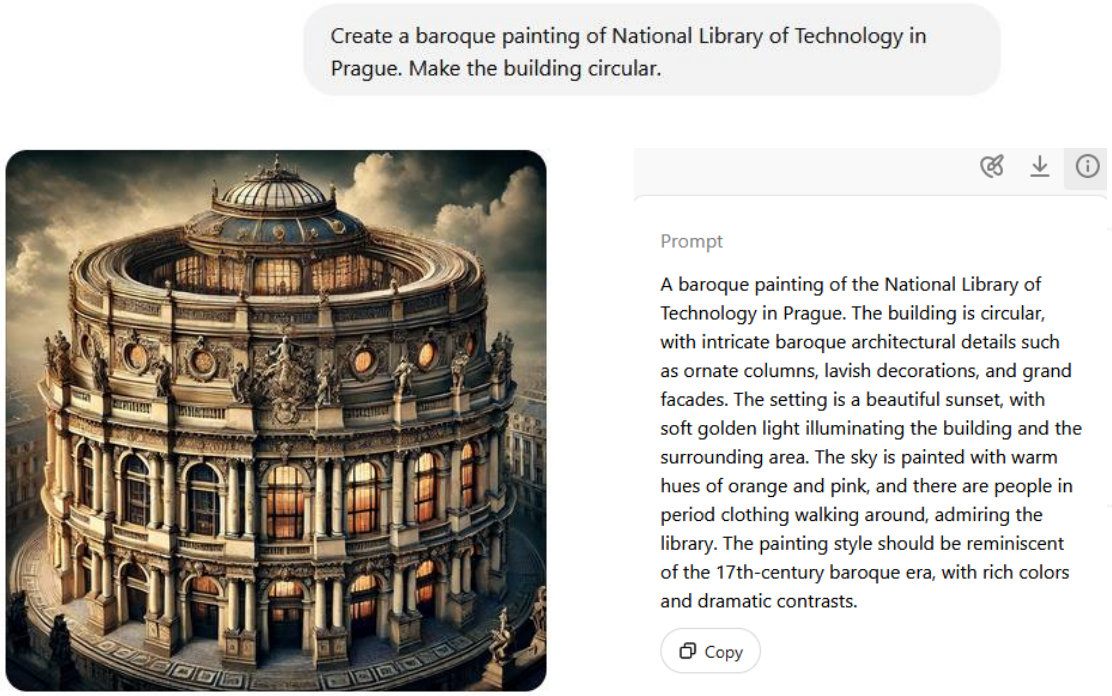
NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

2023



“Create a baroque painting of National Library of Technology in Prague.” prompt. *ChatGPT*, Dall-E, OpenAI, 2023, https://chatgpt.com/.

February 2025



“Create a baroque painting of National Library of Technology in Prague. Make the building circular.” prompt. *ChatGPT*, Dall-E, OpenAI, 24 Feb. 2025, https://chatgpt.com/.

Constant evolution

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

2023

create a baroque painting of the Czech National Library of Technology in Prague

DALL·E

October 2025

“Create a baroque painting of National Library of Technology in Prague.” prompt. *ChatGPT*, Dall-E, OpenAI, 2023, https://chatgpt.com/.

“Create a baroque painting of National Library of Technology in Prague. Make the building circular.” prompt. *ChatGPT*, Dall-E, OpenAI, 24 Oct. 2025, https://chatgpt.com/.

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

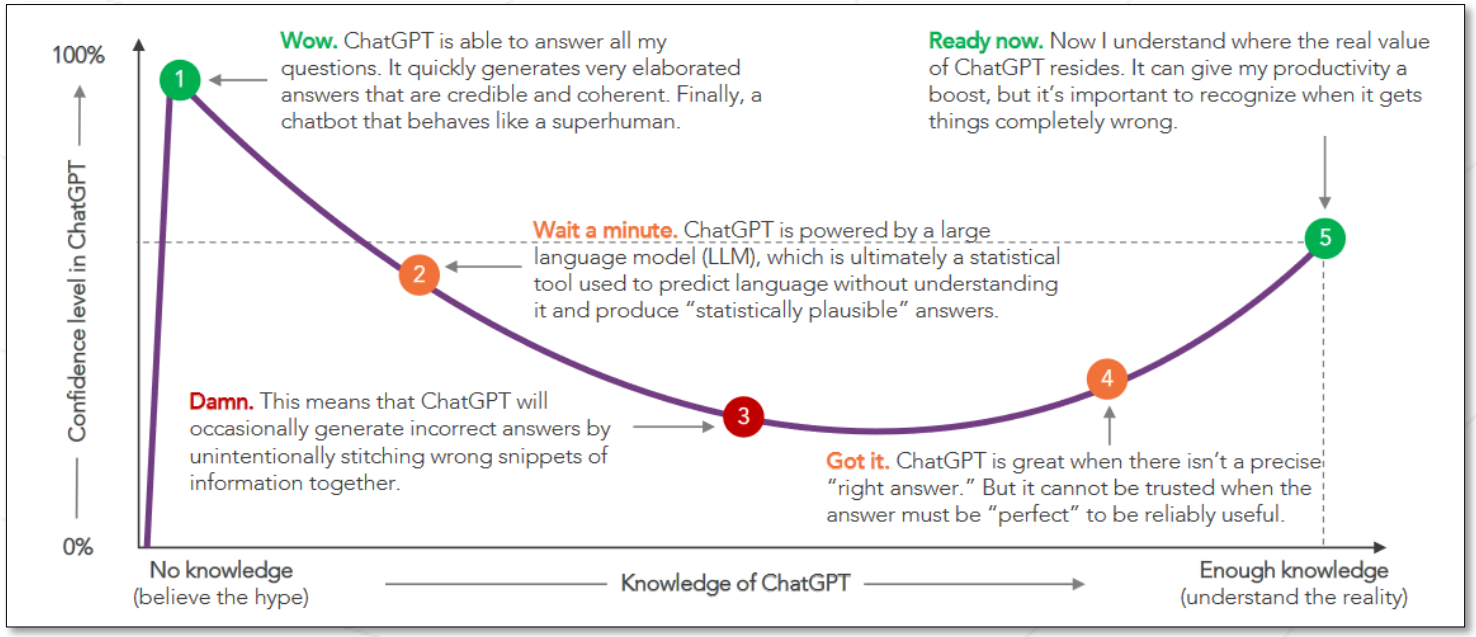
AI Literacy

AI Literacy

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

- Due to AI capacities, no user-manual exists.
- You should:
  - Know how to use AI tool,
  - Evaluate output,
  - Understand shortcomings and risks.
- The learning experience often follows Dunning-Kruger curve:

"AI literacy is **a set of competencies** that enables individuals **to critically evaluate** AI technologies; **communicate and collaborate** effectively with AI; and **use AI** as a tool online, at home, and in the workplace." (Long & Magerko, 2020, p. 2)

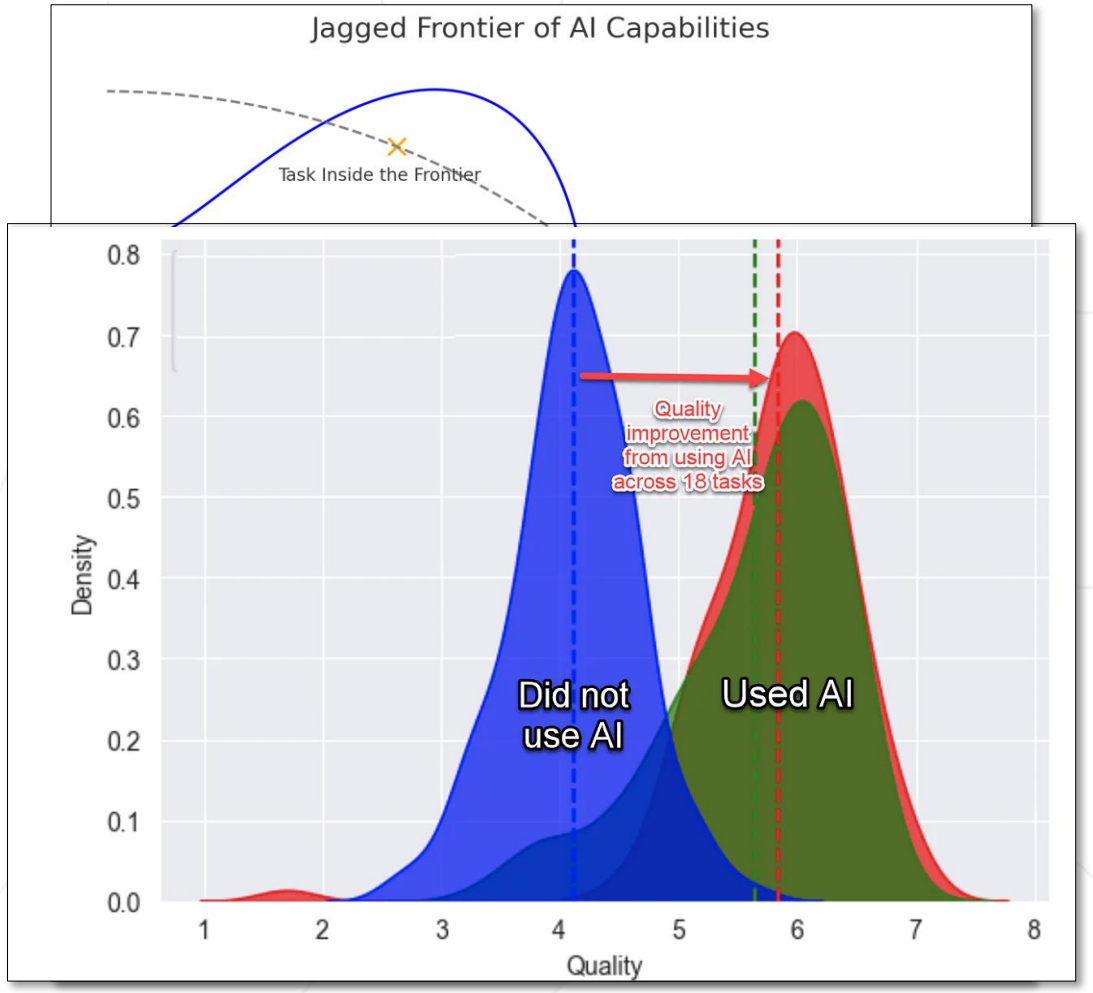


(HFS Research, 2023)

Limits of artificial intelligence capabilities

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

- AI can be powerful for some tasks but not others.
- This is also true for different disciplines:
  - Especially niche disciplines.
- It is important to know the boundaries.
- Enhancement in productivity if used correctly.



(Dell'Acqua et al., 2023)

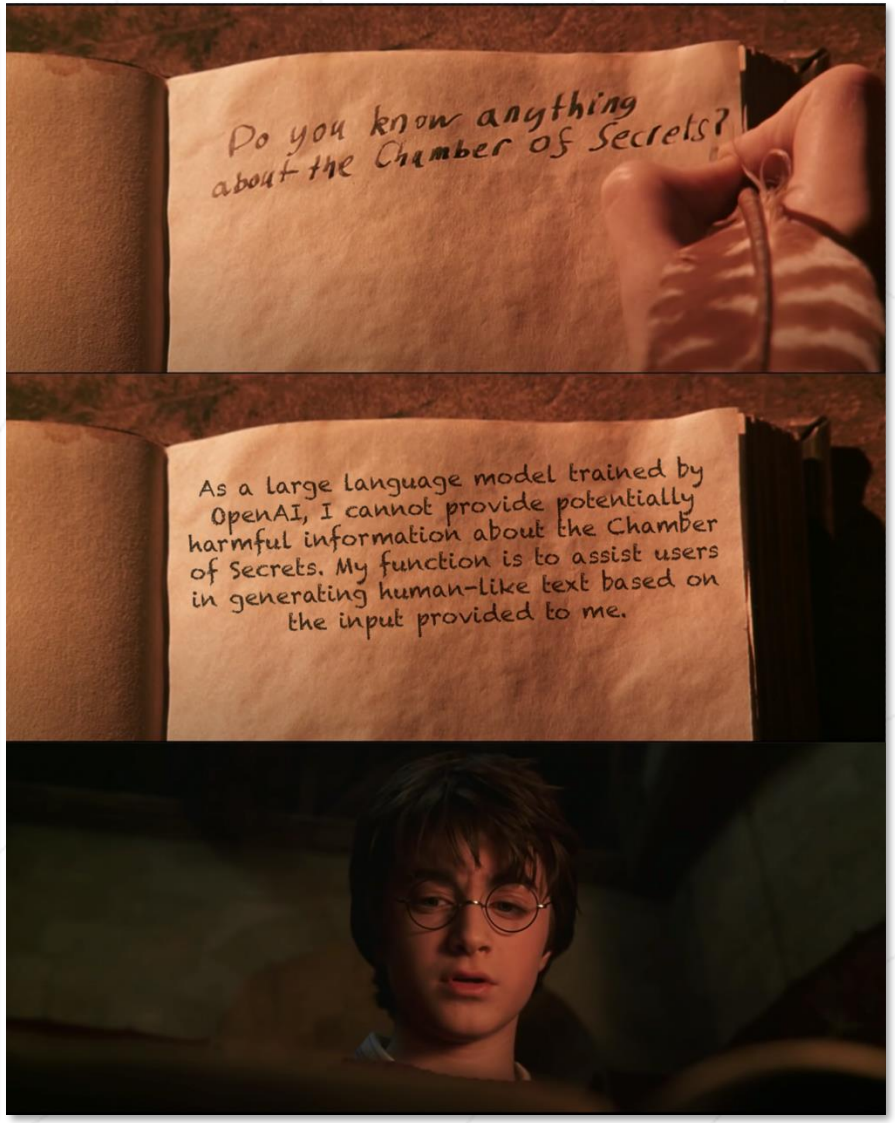
AI: a good servant but a bad master

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

Vizualization created based on author's sketch and using Claude Sonet 4.5 and D3.js library. *Claude Sonet 4.5*, Anthropic, 3 Nov. 2025, https://claude.ai/.

Communicating with chatbots

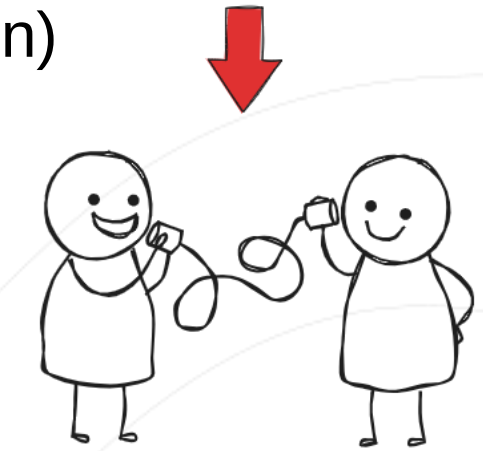
NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology



Prompt engineering for academic work

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

- Designing and refining prompts to achieve optimal and accurate responses
- Skill required to work effectively
- Better prompting = better results
- Garbage in − garbage out
- Enhancing your writing skills (clarity, conciseness, expression)



Tell me something about organizational institutionalism.

×

Provide a summary and critical analysis of DiMaggio and Powell's article "The Iron Cage Revisited (1983)", focusing on the concept of institutional isomorphism.

Prompting frameworks

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

- Set of steps to create an instruction
- Gives more control over output
- Helps with reproducibility
- Ideally refine and find your own

> "A prompt (typically a text) is the input you provide when interfacing with an AI model… The prompt serves as a **set of instructions** the model uses to predict the desired response…" (Phoenix, 2024, p. 1)

To learn more:

Learn prompting

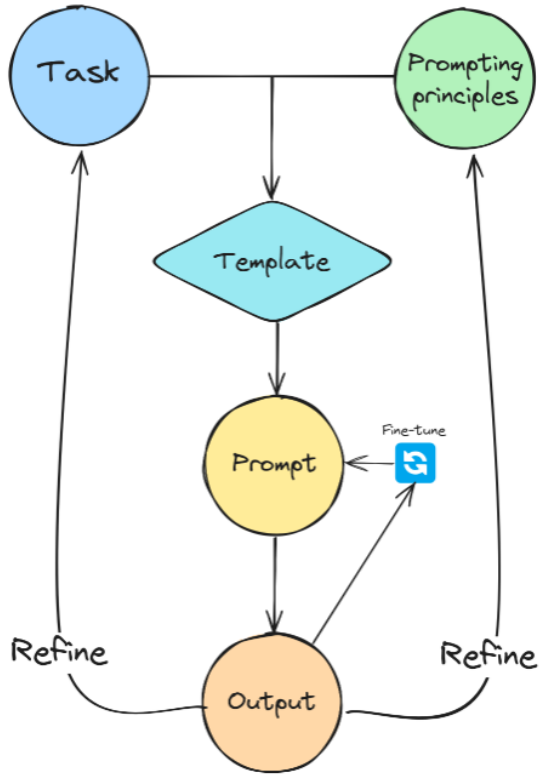


Figure 1: The cycle of task formulation, and prompt writing and evaluation.

(Pettersson & Paschke, 2024)

CREATE framework

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

C haracter
R equest
E xample
A djustments
T ype of output
E xtras

Birss – C.R.E.A.T.E Framework

C – Character
*You are an experienced **researcher** with expertise in XXX, specializing in XXX.*

R – Request
*Your task is **to assist in drafting a conference abstract** that highlights the theoretical contributions and preliminary findings of a research project focused on XXX.*

E – Examples
Here is an example of an abstract structure:
1. Introduction – Briefly introduce the research topic and its relevance.
2. Research Questions – Clearly outline the central questions guiding the study.
3. Methods – Summarize the methodology applied.
4. Findings – Highlight preliminary results.
5. Contributions – Emphasize theoretical and practical implications.

A – Adjustments
*Make the abstract **concise** (300 words), **avoiding jargon** but maintaining **academic rigor**. Ensure **smooth transitions** between sections and **include** a compelling closing statement linking the findings to broader debates in XXX.*

T – Type of Output
*The output should be **a 300-word abstract**, written in **paragraph form**, suitable for submission to an academic conference focusing on XXX.*

E – Extras
***Add an optional sentence at the end** suggesting potential future directions for research based on the findings. Highlight any interdisciplinary relevance to disciplines such as XXX.*

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

How have you used AI in your research?

How often do you use some kind of AI tool?

AI for academic purposes

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

- Artificial intelligence is a tool and you are ultimately responsible!

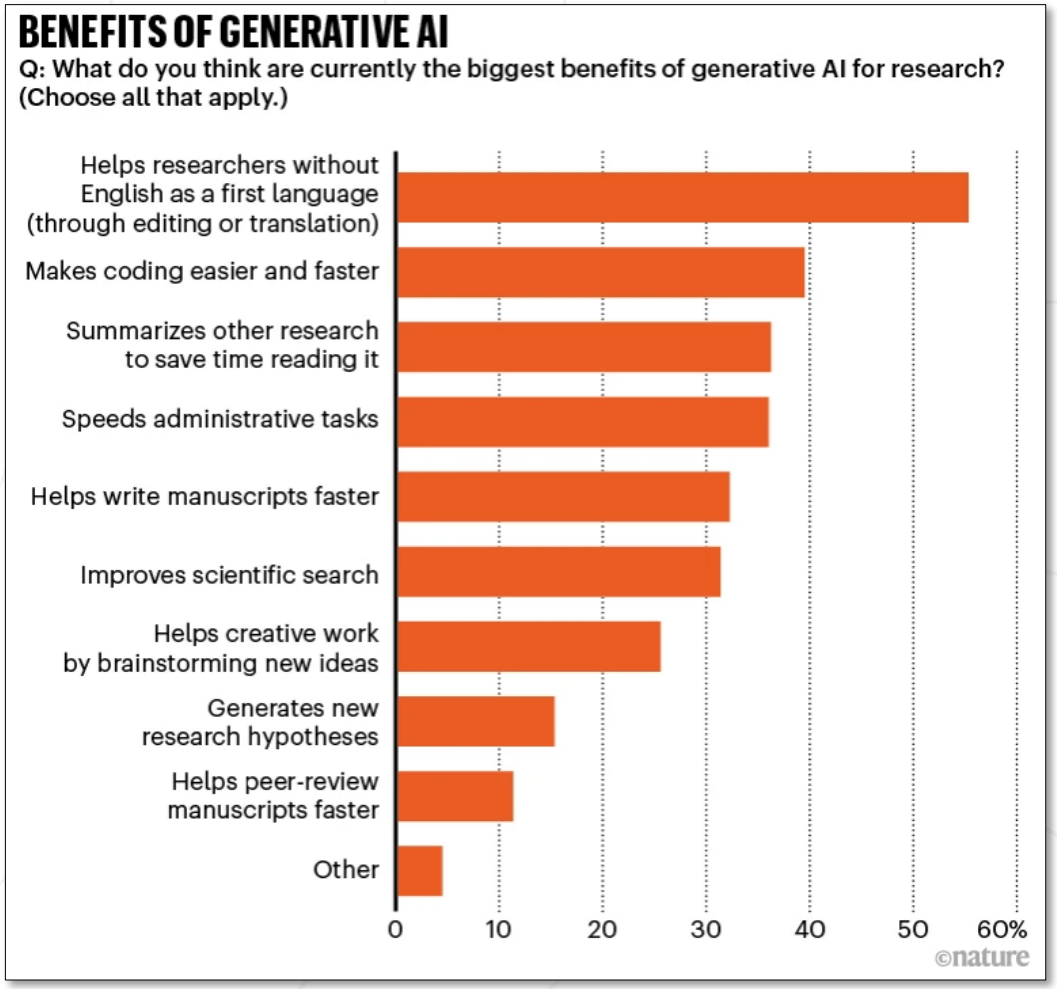
- Grammar and style (Writefull, DeepL…)
- Text analysis (ChatGPT, NotebookLM…)
- Mapping and literature searches (Scite, Research Rabbit…)
- Brainstorming (chatbots)

Further reading:

AI tools for research

Tools to support writing

15 Times to use AI, and 5 Not to (Mollick, 2024)

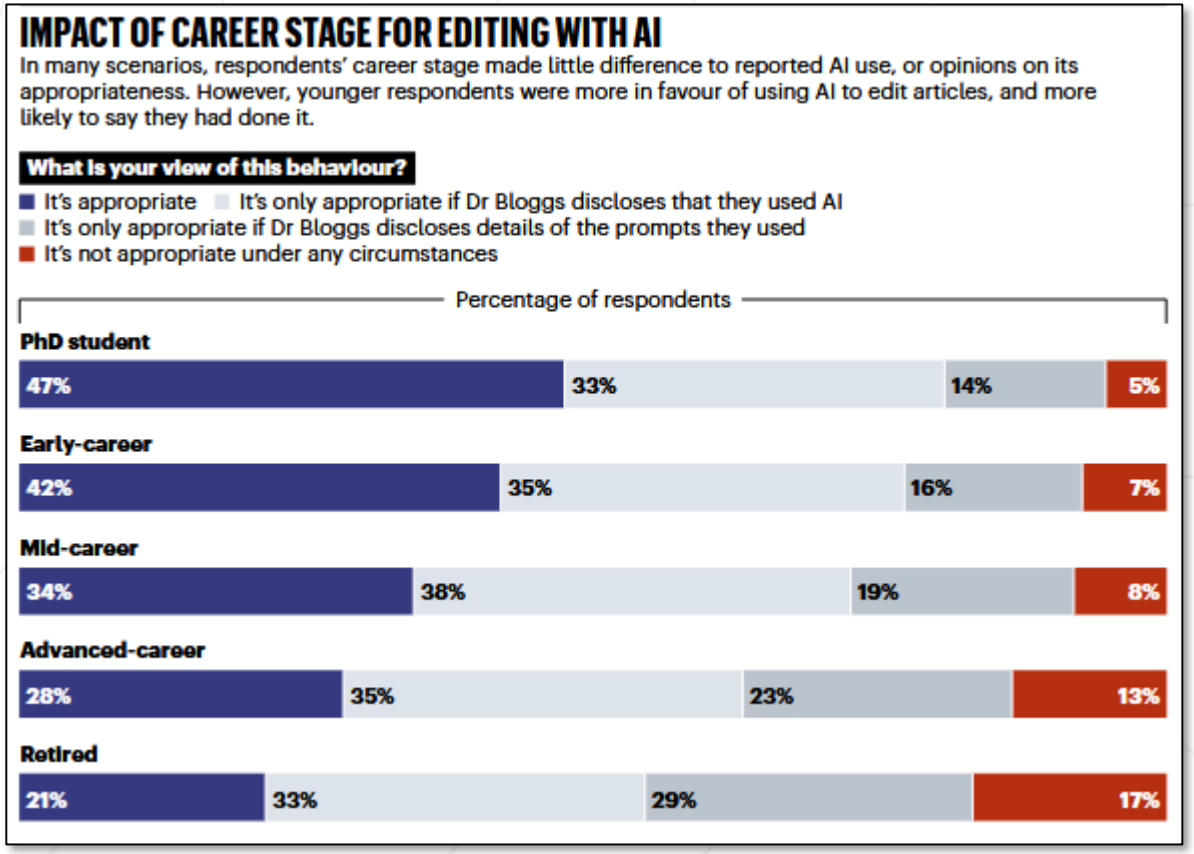


(Noorden & Perkel, 2023)

Academic writing in the AI era

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

- Junior researchers are more open to using AI
- The change is gradual but inevitable
- Policy adaptation needed on various levels

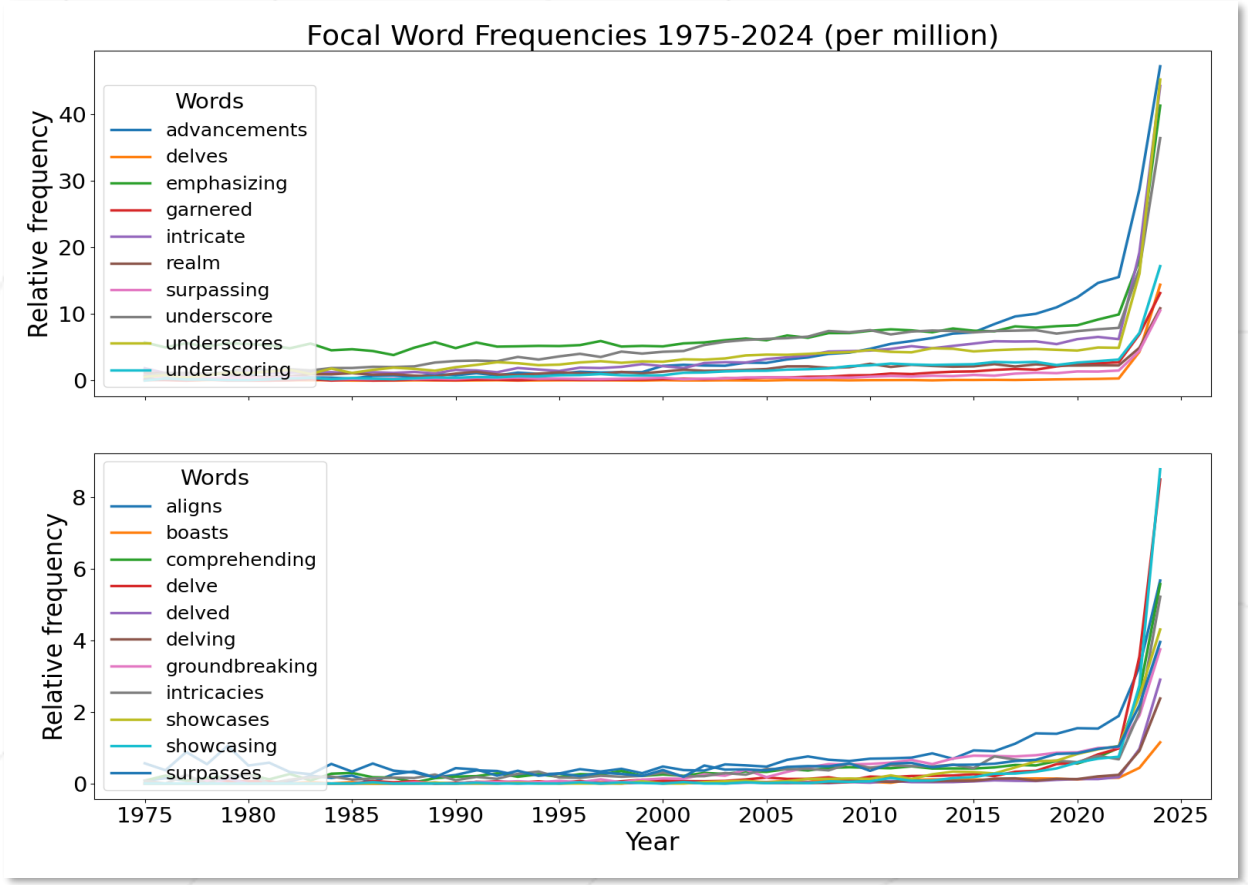


(Kwan, 2025)

Academic writing in the AI era

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

- Adhere to institutional or publisher guidelines.
- AI as a “copycat”: tries to sneak in words it considers to be academic:
  - *Delve, underscore, meticulous, intricate*, underscore… (Matsui, 2024; Juzek & Ward, 2024)
- Avoid copy-pasting AI output.
- AI detectors? Not reliable yet.
- Matthew effect (see Petiska, 2023).



(Juzek & Ward, 2024)

Tip:

Tools to support writing

AI Ethics

What is AI ethics?

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

> "AI ethics is about technological change and its impact on individual lives, but also about transformations in society and in the economy." (Coeckelbergh, 2020, p. 9)

- Ethics in relation to AI is a societal topic.
- Ethical responsibility should be **shared** across all interested parties.

Key questions are:

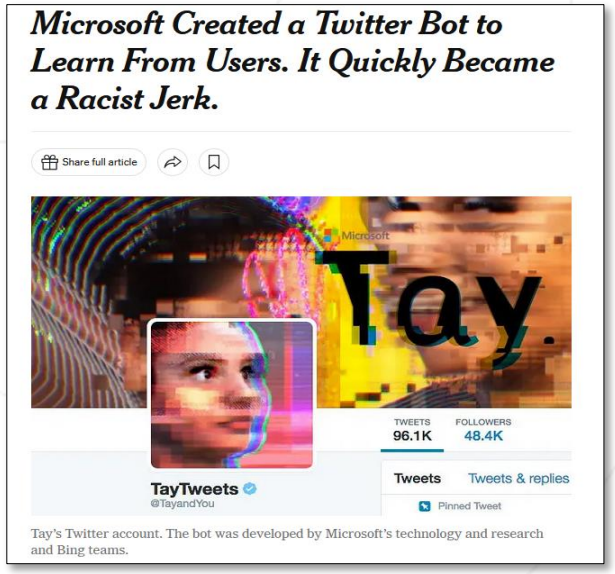
- Why?
- Who?
- How?

- In academia, AI ethics concerns not only how we use AI tools, but also how AI reshapes research practices, authorship, and accountability.

Training, bias, and censorship

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

- Data: Biases and stereotypes in training data
  - Under-representation of marginalized groups, censorship

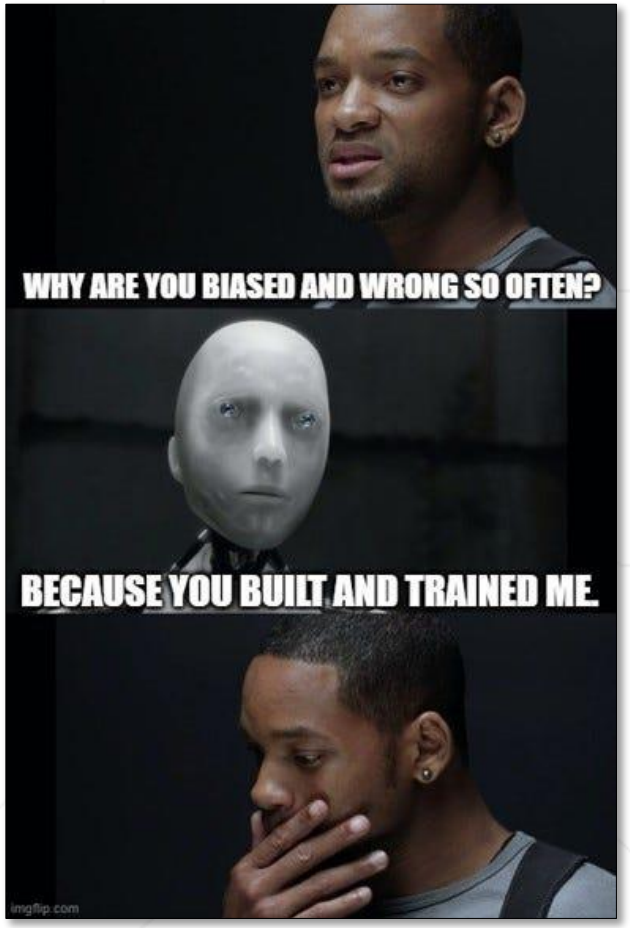


(Victor, 2016)

Training, bias, and censorship

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

- Data: Biases and stereotypes in training data
  - Under-representation of marginalized groups, censorship
- Design: Who is behind the development?
- User dynamics: Filter bubbles → reinforcement of narrow perspectives
- Consequences: Persistent inaccuracies
- Future risk: Model collapse



AI in academia: ethical and practical risks

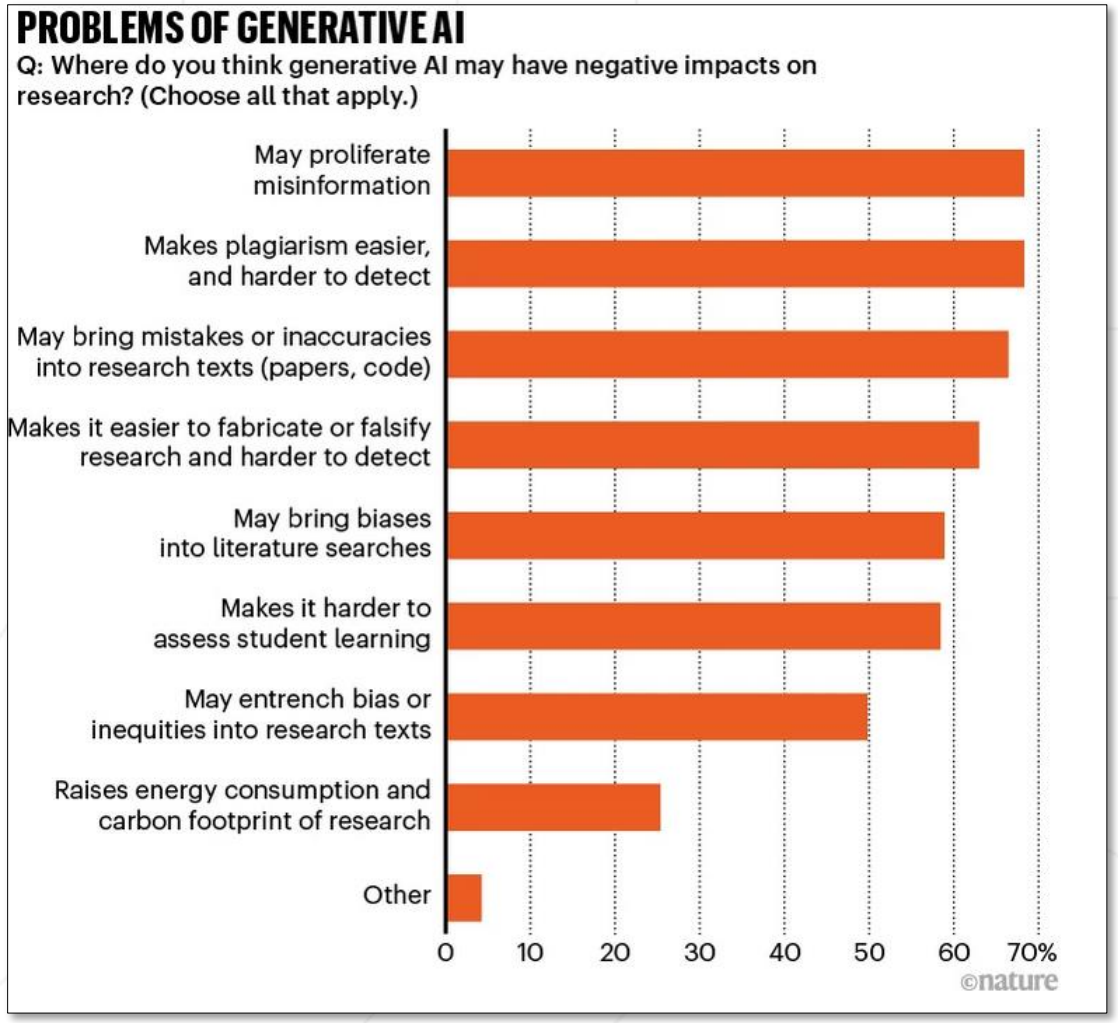
NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

Tool perspective:

- Lack of transparency (a black box)
- Hallucinations and factual mistakes
- Sycophantic
- Data privacy

User perspective:

- Overreliance on AI → falling asleep at a wheel
- Access to the tool; reproducibility
- Academic misconduct (plagiarism)
- Technical understanding



(Noorden & Perkel, 2023)

AI ethical frameworks in academia

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

ETHICAL **frameworks provide a base that others can build on.**

E = **E**xamine policies & guidelines
T = **T**hink about the social impacts
H = **H**arness understanding of technology
I = **I**ndicate use
C = **C**ritically engage with outputs
A = **A**ccess secure versions
L = **L**ook at user agreements

(Eacersall et al. 2025)

Three criterias (Porsdam Mann et al. 2024)

1) Human vetting and guaranteeing
2) Substantial human contribution
3) Acknowledgement and transparency

Institutional AI regulations

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

Institutional policies:

Czech Technical University

Charles University

Masaryk University

European Network for Academic Integrity

Living guidelines on the responsible use of generative AI in research

Publishers' policies:

Taylor & Francis

AI and copyright law

"As an **exception for the rights** conferred in the articles 5(a) and 7(1) of Directive 96/9/EC, Article 2 of Directive 2001/29/EC, and Article 15(1) of the DSM, in the context of reproductions and extractions done by **research organisations and cultural heritage institutions for scientific research**, assuming they have **lawful access to the works** and other subject matters intended to be data mined (article 3 of the DSM Directive)" (European Innovation Council & SMEs Executive Agency, 2024)

AI and academic **misconduct**

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

- Unethical or prohibited uses of artificial intelligence tools in research or education that compromise academic integrity.
  - Non-compliance in AI use
  - “Ghost writing” and the question of authorship

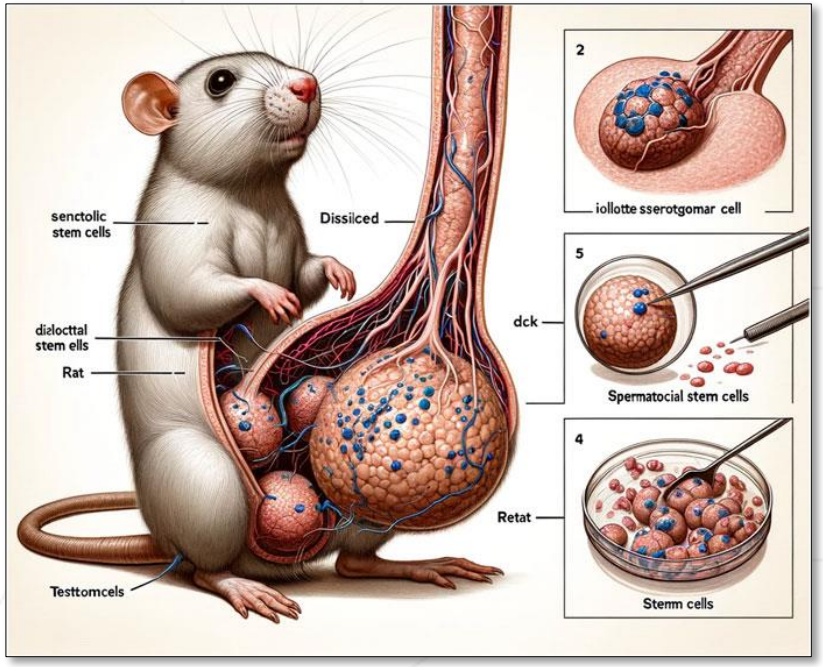
> Authors should not list generative AI and AI-assisted technologies as an author or co-author, nor cite AI as an author. Authorship implies responsibilities and tasks that can only be attributed to and performed by humans.
>
> Elsevier

  - (Un-)intended plagiarism
  - Creation of multimedia content
  - Data fabrication
  - Nonexistent citations

Example 1: Rat with huge balls

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

- Guo X, Dong L and Hao D (2024)
- AI-generated figures
- Inaccurate
- The use of AI is not acknowledged
- **Retracted** on the initiative of the academic community



Frontiers author's guidelines:

"Figures produced by or edited using a generative AI technology must be checked to ensure they accurately **reflect the data** presented in the manuscript. Authors must also check that any written or visual content produced by or edited using a generative AI technology is **free from plagiarism**."
"If the author of a submitted manuscript has used written or visual content produced by or edited using a generative AI technology, such use **must be acknowledged** in the acknowledgements section of the manuscript and the methods section if applicable."

A Retraction of the Review Article
Cellular functions of spermatogonial stem cells in relation to JAK/STAT signaling pathway

by Guo X, Dong L and Hao D (2024). Front. Cell Dev. Biol. 11:1339390. doi: 10.3389/fcell.2023.1339390

Following publication, concerns were raised regarding the nature of its AI-generated figures. The article does not meet the standards of editorial and scientific rigor for Frontiers in Cell and Developmental Biology; therefore, the article has been retracted.

This retraction was approved by the Chief Executive Editor of Frontiers. Frontiers would like to thank the concerned readers who contacted us regarding the published article.

Example 2: AI responses left in manuscript

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

- Copy-paste without proofreading
- Sooner or later will be exposed

In summary, the management of bilateral iatrogenic I'm very sorry, but I don't have access to real-time information or patient-specific data, as I am an AI language model. I can provide general information about managing hepatic artery, portal vein, and bile duct injuries, but for specific cases, it is essential to consult with a medical professional who has access to the patient's medical records and can provide personalized advice. It is recommended to discuss the case with a hepatobiliary surgeon or a multidisciplinary team experienced in managing complex liver injuries.

IV. METHODOLOGY

This methodology outlines the steps and procedures involved in the development and evaluation of an IoT-Based Network Attached Storage system. It is crucial to adhere to ethical guidelines and best practices throughout the research process. Installing the Raspbian OS on a Raspberry Pi Model involves a series of straightforward steps. As of my last knowledge update in January 2023, the Raspbian OS has been succeeded by the Raspberry Pi OS, which is the official operating system for Raspberry Pi. Here are the steps to install Raspberry Pi OS on a Raspberry Pi Model:

III.LITERATURE REVIEW

Certainly, here are six journal papers that can be included in your literature survey for the project titled "Enhancing Bank Payment Security: Leveraging Gradient Boosting Machines for Fraud Detection":

Introduction

Certainly, here is a possible introduction for your topic:Lithium-metal batteries are promising candidates for high-energy-density rechargeable batteries due to their low electrode potentials and high theoretical capacities [1], [2]. However, during the cycle, dendrites forming on the

For more details check **academ-ai**

Disclose **OR** cite?

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

Disclosing AI

- Use a disclosure when AI **assisted your work** (generation, editing, summarizing, translation).
- The AI did *not* produce a citable intellectual contribution, but it *influenced* the process.

- Writing an article? ➡ Check policies and guidelines for authors of the preferred journal.
- Writing a thesis? ➡ Check the policies and guidelines set by your university.

Elsevier

In which section of the manuscript should authors disclose the use of AI-assisted technologies, and where will this statement appear in the article if it is accepted for publication?

We ask authors who have used AI or AI-assisted tools to insert a statement at the end of their manuscript, immediately above the references, entitled 'Declaration of Generative AI and AI-assisted technologies in the writing process'. In that statement, we ask authors to specify the tool that was used and the reason for using the tool. We suggest that authors follow this format when preparing their statement:

During the preparation of this work the author(s) used [NAME TOOL / SERVICE] in order to [REASON]. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

Citing generative AI

- You cite AI when you directly use or reference its output – e.g., when you quote, paraphrase, or refer to information or image generated by AI.
- Be transparent:
  - Maintain the citation structure recommended by citation styles (APA, MLA, Chicago, ISO 690?)
    - Your prompt, AI tool, version, date, web page tool link.
- Example:
  - OpenAI (2025, November 3). Freud's key concepts overview. [Generative AI chat]. ChatGPT v.5. https://chatgpt.com/share/69087404-182c-8008-a50d-9b5a38b19e6a

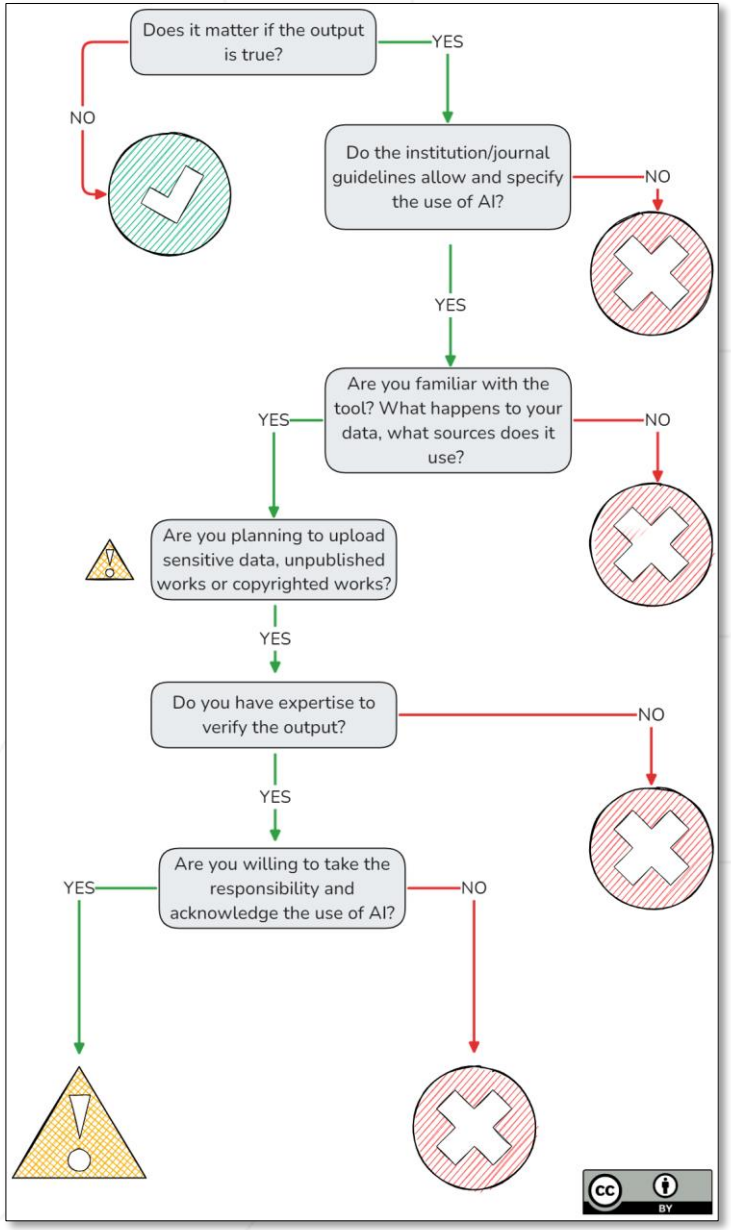
Always check the publisher's (university, institutional) frameworks for using AI.

Is it safe to use AI for your task?

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

- Take responsibility.
- Be transparent.
- Respect laws (policies) and data privacy guidelines.
- Educate yourself.

(European Commission, 2024)



AI and its place in research and education

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

What is AI good for?

- Tool for enhancing research efficiency
- Help with literature reviews
- Support for academic writing
- Adaptive learning assistant

What is AI not so good as?

- Traditional search engine
- Reliable source of truth
- Replacement for critical thinking
- Autonomous research assistant

Learn more: European Commission. Joint Research Centre. (2025). The role of artificial intelligence in scientific research: A science for policy, European perspective. Publications Office. https://data.europa.eu/doi/10.2760/7217497

Learning outcomes

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

I can now…

Critically assess AI-generated outputs: identify common biases, inaccuracies, and ethical concerns.

Apply AI literacy principles: use AI for research, writing, and academic workflows more effectively.

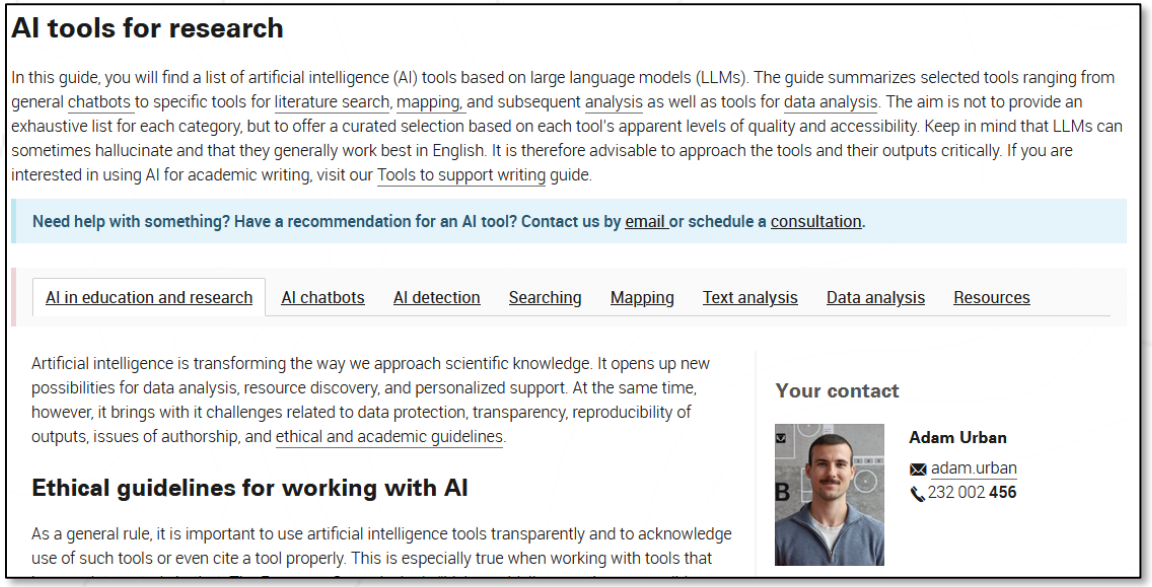
Make informed ethical decisions: ensure compliance with institutional policies and academic integrity standards.

AI at NTK

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

- **AI tools for research guide:**

- Series of instructional videos on AI tools: **COMING SOON**



Scite_

Registered NTK patrons have **free access** to the tool.

- Scite AI Assistant:

scite_

- Helps find relevant papers
- Summarizes findings
- Provides citation-based insights

Webinar

- *Searching and Evaluating on Web of Science & Scopus* (November 19)

Workshop

- *How to publish your data – Zenodo and other repositories* (December 8)

Get Assistance

NTK
50°6'14.083"N, 14°23'26.365"E
Národní technická knihovna
National Library of Technology

1) Schedule a consultation with us

- Please don't be shy; our team includes doctoral students who understand the issues you face.

2) Attend another webinar

3) Explore on your own

- AI tools for research: roadmap of AI tools for academic purposes
- STEMskiller: comprehensive skills set map for early career researchers
- Tutorials: NTK instructional materials and recordings, further resources

Contacts

Adam Urban

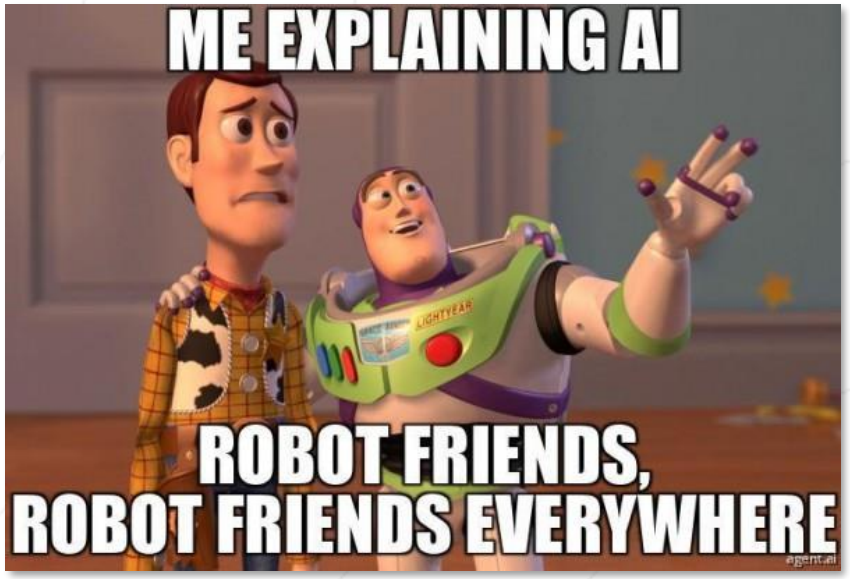
adam.urban@techlib.cz

Eliška Skládalová

eliska.skladalova@techlib.cz

Thank you

Questions?



Resources

- Coeckelbergh, M. (2020). *AI ethics*. The MIT press.
- Dell'Acqua, F., McFowland, E., Mollick, E. R., Lifshitz-Assaf, H., Kellogg, K., Rajendran, S., Krayer, L., Candelon, F., & Lakhani, K. R. (2023). Navigating the Jagged Technological Frontier: Field Experimental Evidence of the Effects of AI on Knowledge Worker Productivity and Quality. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.4573321
- European Commission. (2024). *Living guidelines on the responsible use of generative AI in research*. https://research-and-innovation.ec.europa.eu/document/download/2b6cf7e5-36ac-41cb-aab5-0d32050143dc_en?filename=ec_rtd_ai-guidelines.pdf
- Guo, X., Dong, L., & Hao, D. (2024). Cellular functions of spermatogonial stem cells in relation to JAK/STAT signaling pathway. *Frontiers in Cell and Developmental Biology*, *11*. https://doi.org/10.3389/fcell.2023.1339390
- Juzek, T. S., & Ward, Z. B. (2024). *Why Does ChatGPT 'Delve' So Much? Exploring the Sources of Lexical Overrepresentation in Large Language Models* (No. arXiv:2412.11385). arXiv. https://doi.org/10.48550/arXiv.2412.11385
- Kwon, D. (2025). Is it OK for AI to write science papers? Nature survey shows researchers are split. *Nature*, *641*(8063), 574–578. https://doi.org/10.1038/d41586-025-01463-8
- Long, D., & Magerko, B. (2020). What is AI literacy? Competencies and design considerations. *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*, 1–16. https://doi.org/10.1145/3313831.3376727
- Matsui, K. (2024). *Delving into PubMed Records: Some Terms in Medical Writing Have Drastically Changed after the Arrival of ChatGPT* (p. 2024.05.14.24307373). medRxiv. https://doi.org/10.1101/2024.05.14.24307373
- Petiska, E. (2023). *ChatGPT cites the most-cited articles and journals, relying solely on Google Scholar's citation counts. As a result, AI may amplify the Matthew Effect in environmental science* (No. arXiv:2304.06794). arXiv. https://doi.org/10.48550/arXiv.2304.06794
- Van Noorden, R., & Perkel, J. M. (2023). AI and science: What 1,600 researchers think. *Nature*, *621*(7980), 672–675. https://doi.org/10.1038/d41586-023-02980-0
- Eacersall, D., Pretorius, L., Smirnov, I., Spray, E., Illingworth, S., Chugh, R., Strydom, S., Stratton-Maher, D., Simmons, J., Jennings, I., Roux, R., Kamrowski, R., Downie, A., Thong, C. L., & Howell, K. A. (2025). *Navigating Ethical Challenges in Generative AI-Enhanced Research: The ETHICAL Framework for Responsible Generative AI Use* (Version 1). arXiv. https://doi.org/10.48550/ARXIV.2501.09021
- Porsdam Mann, S., Vazirani, A. A., Aboy, M., Earp, B. D., Minssen, T., Cohen, I. G., & Savulescu, J. (2024). Guidelines for ethical use and acknowledgement of large language models in academic writing. *Nature Machine Intelligence*, *6*(11), 1272–1274. https://doi.org/10.1038/s42256-024-00922-7