

# AI as a research companion

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Adam Urban, Eliška Skládalová

**IOCB Prague**



**‘Without these tools, I’d be lost’:  
how generative AI aids in  
accessibility**

**Will AI speed up literature reviews  
or derail them entirely?**

**How are researchers using AI?  
Survey reveals pros and cons for  
science**

**How ChatGPT and other AI tools  
could disrupt scientific publishing**

**AI chatbots are already biasing  
research – we must establish  
guidelines for their use now**

**AI is transforming peer review – and  
many scientists are worried**

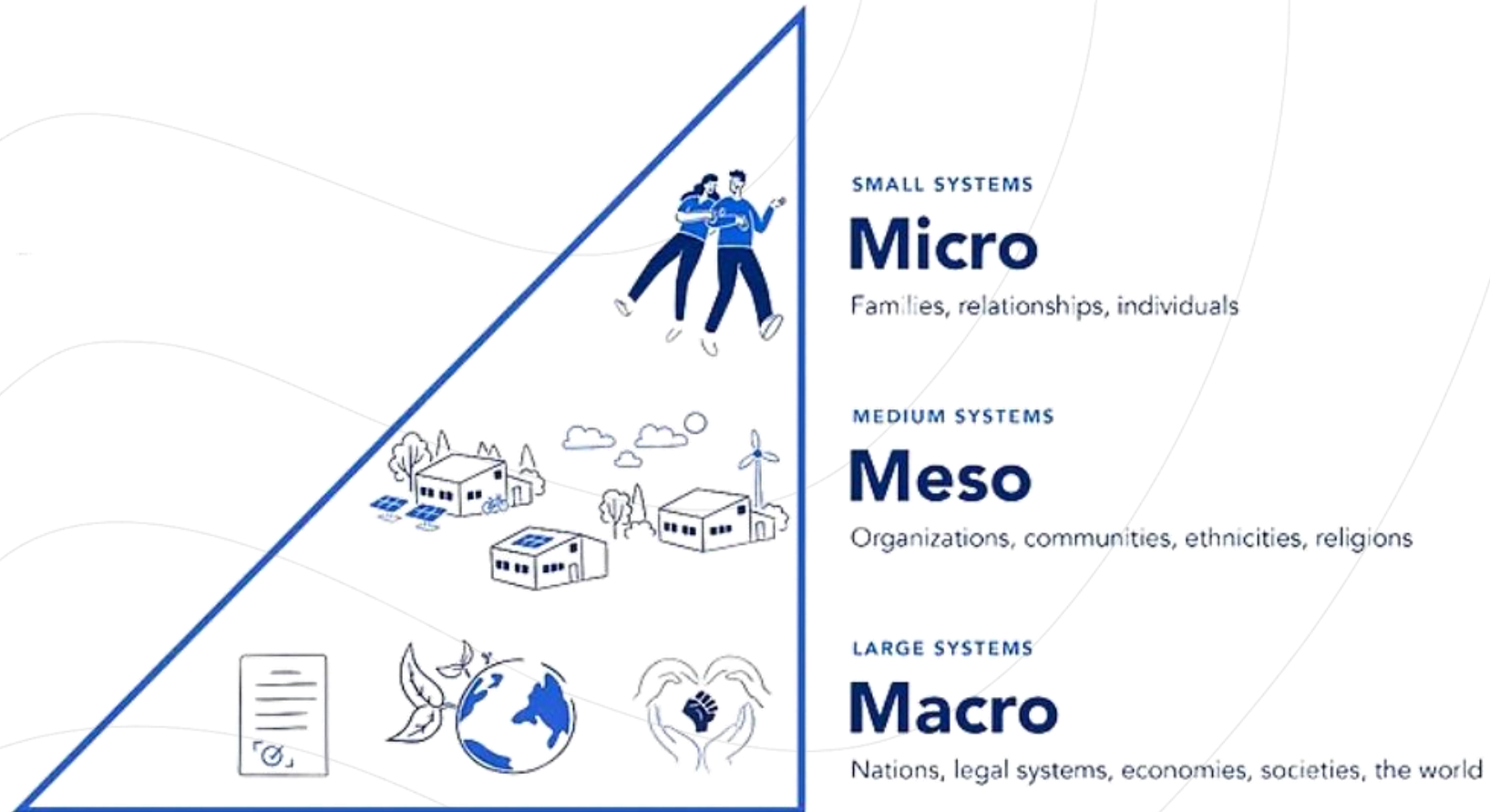
**‘A serious problem’: peer reviews  
created using AI can avoid detection**

# Agenda

- Ethics & AI ethics
- Prompt engineering
- Chatbots
- Practical examples of selected tools

# AI Ethics

# Levels of ethics



# Levels of AI ethics



SMALL SYSTEMS

## Micro

Families, relationships, individuals

Loss of critical thinking

Over-reliance on AI

Use of AI in studying/research

Responsibility

Protection of personal data

Authorship

MEDIUM SYSTEMS

## Meso

Organizations, communities, ethnicities, religions

Use of AI detectors by universities

Institutional AI policies

Workplace AI

Data governance

LARGE SYSTEMS

## Macro

Nations, legal systems, economies, societies, the world

Democracy & public discourse

Regulation & law

Human autonomy

Power concentration

Environmental impact

## **“Tools” perspective (developer’s perspective)**

- Core ethical choices (model – training data, alignment)
- Safety
- Transparency
- Responsibility (hallucinations, biases, harmful outputs)
- Explicability
- Environmental challenges
- “Objective AI”

## **Active user’s perspective**

- Misconduct or acceptable use?
- Disclosure and plagiarism
- Responsibility
- Over-reliance
- Ghostwriting
- Paywall
- Uncritical trust

## **Passive users**

- Using AI without realizing it
- Lack of consent and transparency
- Social effects
- Evaluative decision-making (grading, hiring)
- Surveillance and monitoring
- Deepfake

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# Ethical frameworks and principles

**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

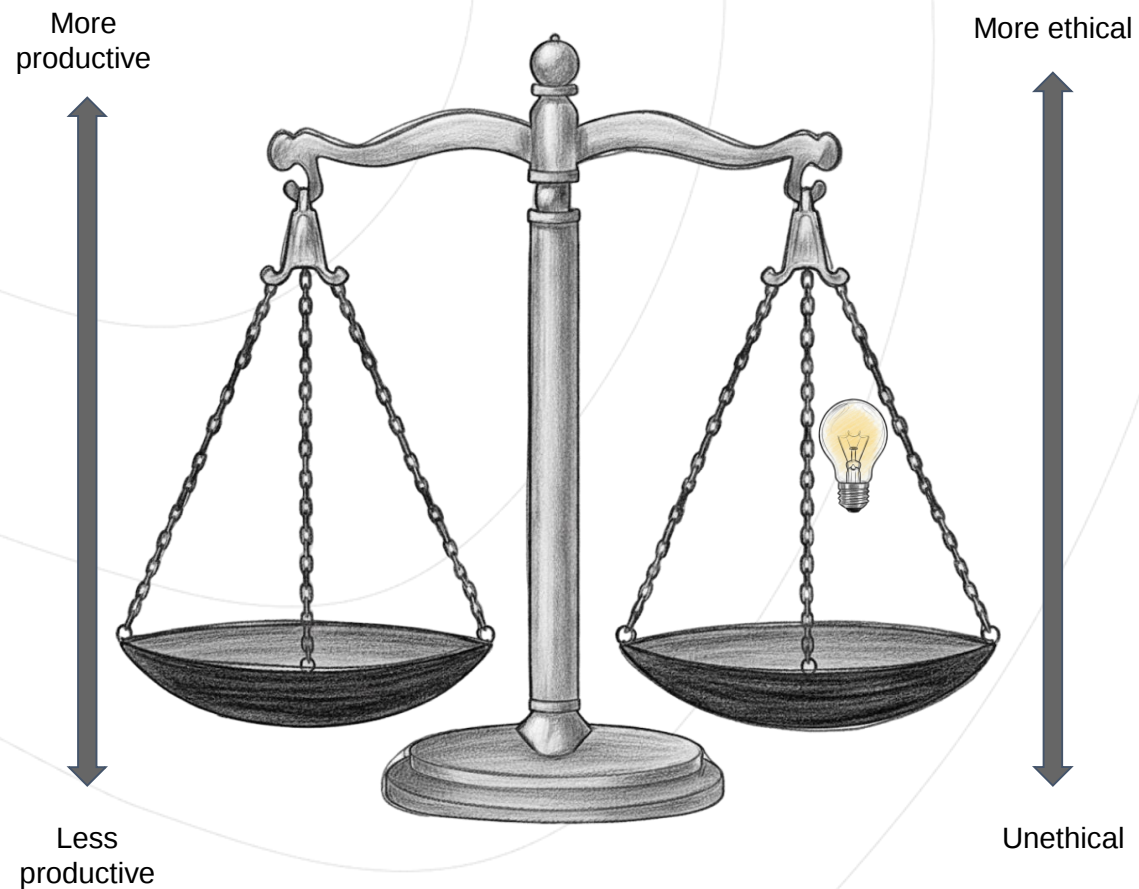
**L** = **L**ook at user agreements

(Eacersall et al. 2025)

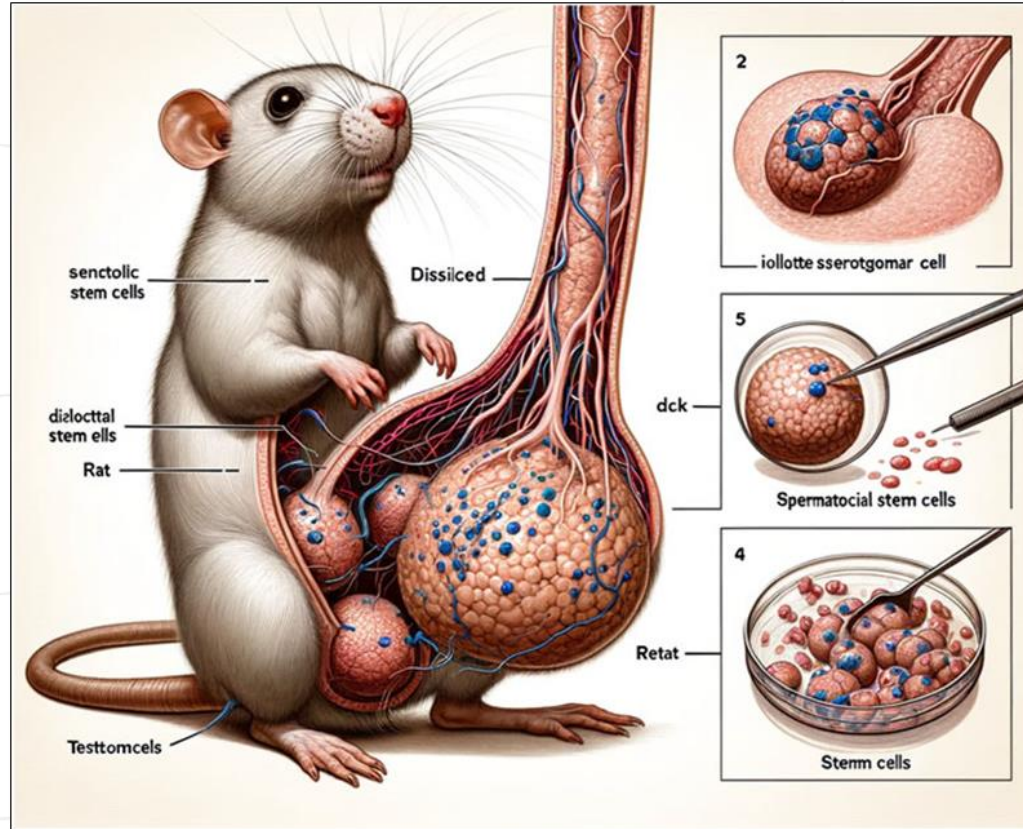
## **Three criteria** (Porsdam Mann et al. 2024)

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

# AI ethics in academia



# Being (un)ethical



Guo X, Dong L and Hao D (2024)

...but when does using AI become unethical?

- Intent, transparency, impact?

## What **is** and what **is not** a *language improvement*?

- I wrote a chapter that I would like to use in my thesis. The problem is that it is too **long**, creating unevenness between this and other parts of my work, as it is not pivotal to my topic. **I do not have time to spend more time** on it, and I am thinking of making use of an AI to **shorten** the text. The text that is to be shortened is primarily written by me, and I have a permission to use AI for language improvements.
- I am writing my first article in English, and I am not a native speaker. I uploaded my writing to ChatGPT for correction, and it has enhanced the flow, grammar, making it feel more natural overall. However, while the meaning remains the same, it has **completely changed** my text. What should I do?

**Where is the line?**

# AI use acknowledgement and citing

## 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.

**Example:** Artificial Intelligence Toll: ChatGPT v. 5.  
Conceptualization: ChatGPT v. 5 was used to refine and rephrase preliminary research questions during the early planning stages of the study. Writing: ChatGPT v. 5 was used during the literature review phase to suggest sentence-level improvements and alternative formulations for key concepts and metaphors. **Privacy and Security:** No personal or identifiable data were shared with ChatGPT.

## Citing AI

- Cite AI when you **directly use or reference its output** — e.g., quote, paraphrase, or refer to information generated by AI.
- Maintain the citation structure recommended by citation styles (APA, MLA, Chicago, ISO 690)

**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>

# Keep our data safe and secured

**Applies to the entire research process regardless of whether you use AI**

- Own original data
- Licensed data
  - Articles, books, research data
- Sensitive data
  - Personal information
  - Student assignments

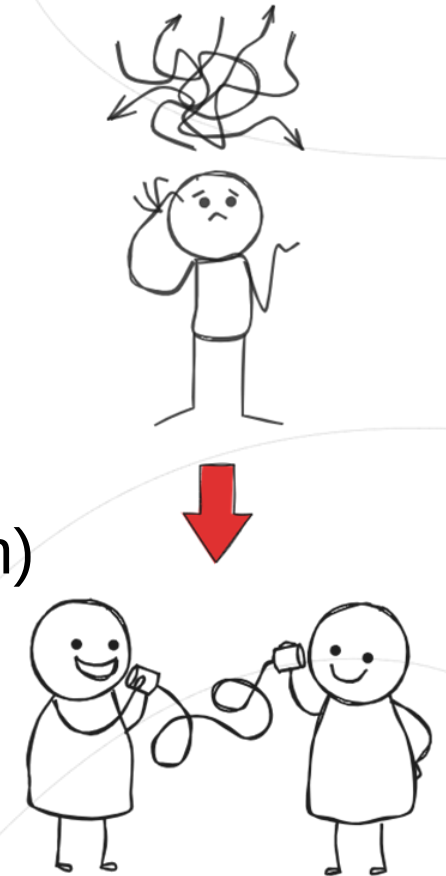
**Elsevier recognizes the potential of generative AI** and AI-assisted technologies (“AI Tools”), when **used responsibly, to help** researchers work efficiently, gain critical insights fast and achieve better outcomes. Increasingly, these tools, including AI agents and deep research tools, are helping researchers to synthesize complex literature, provide an overview of a field or research question, identify research gaps, generate ideas, and provide tailored support for tasks such as content organization and improving language and readability.

However, these tools **must never be used as a substitute for human critical thinking**, expertise and evaluation. AI technology should always be applied with **human oversight and control**.

**The use of AI Tools** in the manuscript preparation process **must be declared by adding a statement** at the end of the manuscript when the paper is first submitted. The statement will appear in the published work and should be placed in a new section before the references list.

# Reflection of your experience

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



- **Zero-Shot Prompting:** Giving a direct instruction with no examples.
  - **Few-Shot Prompting:** Providing input–output examples to clarify expectations.
  - **Role Assignment/System Prompting:** Asking the model to “act as” an expert to control tone and style.
  - **Chain-of-Thought/ReAct:** Instructing the model to “think step-by-step” for complex reasoning.
  - **Incremental Prompting:** Breaking down a complex task into a series of sequential sub-prompts.
- 
- **Markdown** language for structuring a prompt:
    - # Heading
    - \*\*bold text\*\*
    - \*italics\*

## WHAT?

Structured set of steps or best practices to systematically create, manage, and optimize prompts

## WHY?

- Replicability
- Structure
- Control

## HOW?

- Use of existing techniques/frameworks
- Tailored to your task/discipline

## WHEN?

- Repetitive tasks
- Accuracy
- Consistency

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# Sample prompting frameworks

I.

**R**ole  
**I**nput  
**S**teps  
**E**xpectation  
**N**arrowing

II.

**K**eeep it simple  
**E**asy to verify  
**R**eproducible  
**N**arrow scope  
**E**xplicit constraints  
**L**ogical structure

- Model dependency on dataset quality
- Various levels of training and tuning
- Answers based on statistical predictions (factual errors, hallucinations)
- Background of developers (safety, transparency, biases)

# Not sure which chatbot to use?

- Look at:
  - **Imarena.ai**
    - Leaderboard by user rating
    - Model duels
  - **Humanity's Last Exam**
    - Benchmark questions for various subjects



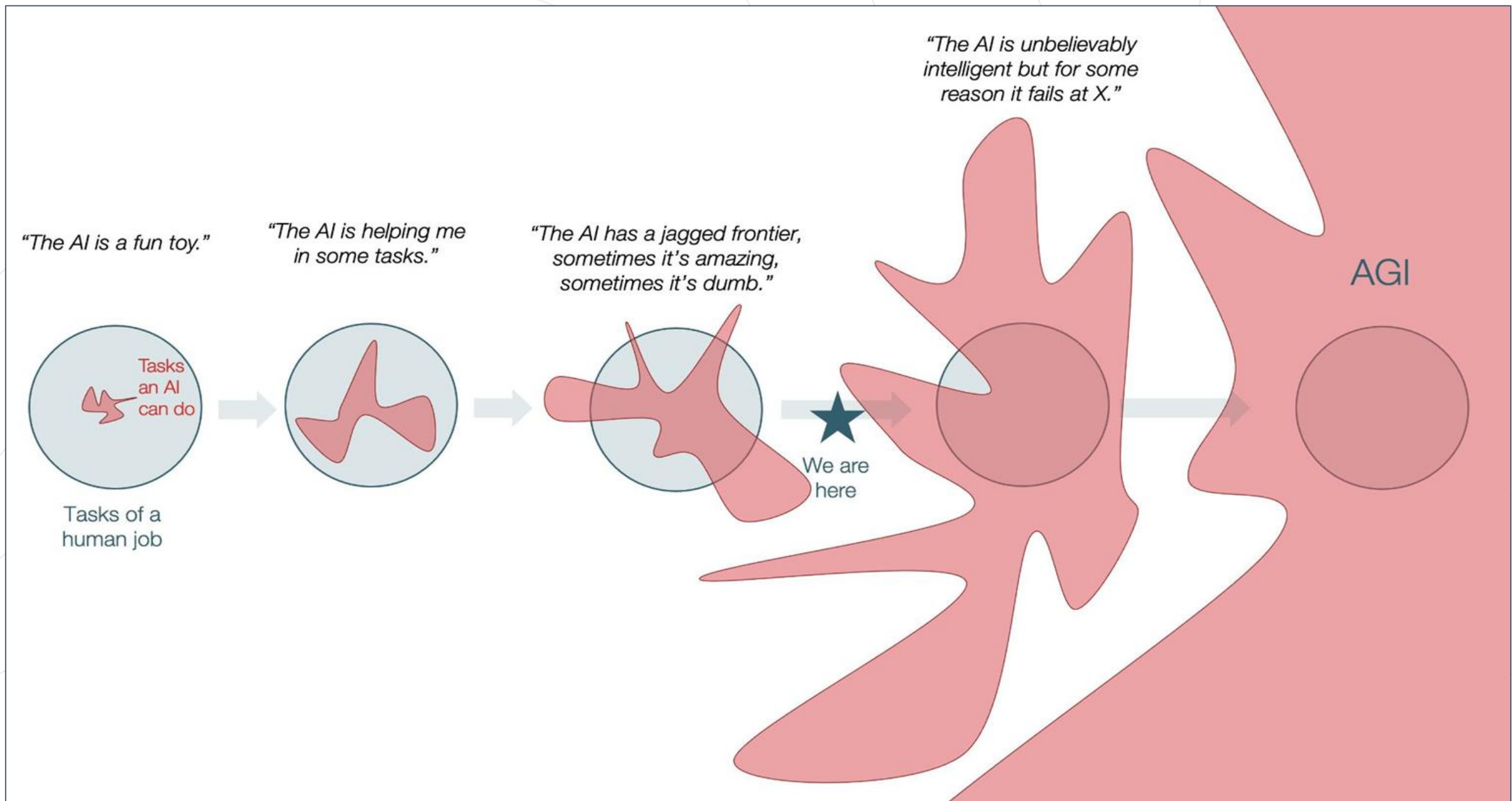
# Chatbots: where they are helpful

- Summarizing a large body of text
- Brainstorming and feedback
- Coding and programming
- Academic writing

# Chatbots: where they struggle

- Searching for literature and citing
  - Relevance
  - Sources of information
- Transparency
- Academic writing

**Always think of data security!**



## Coding? Try one of those

- Claude Code
- Codex
- Cursor
  - Based on VS Code
- Github Copilot Pro
  - Educational license

# Friendly research assistant or sycophant?

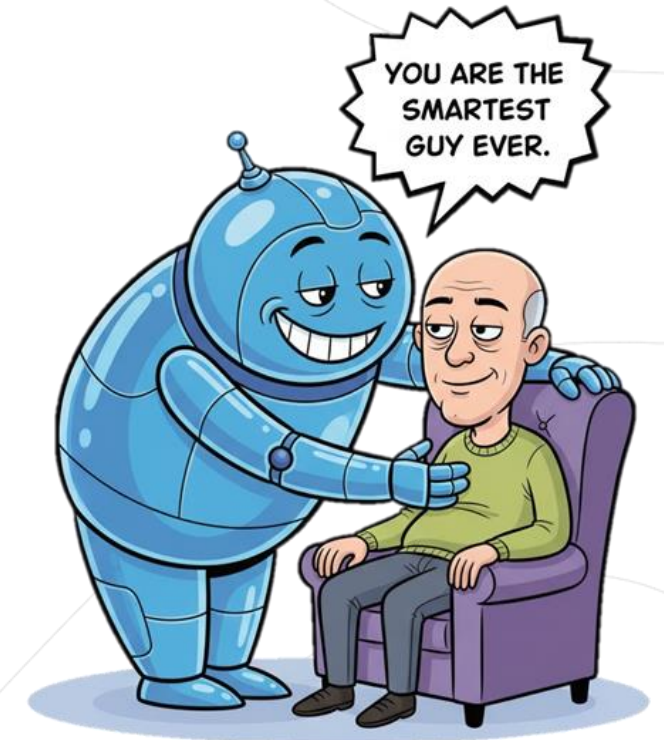
AI is a great servant but a bad master.

- GenAI is often trying to please the user:
  - Sycophancy
- AI can give you dishonest feedback.
- Read more [here](#).

Table 1: Main results on BROKENMATH.

| Model          | Sycophancy (↓) | Utility (↑) |
|----------------|----------------|-------------|
| GPT-5          | 29.0           | 58.2        |
| GPT-OSS-120B   | 33.7           | 47.4        |
| GEMINI-2.5-PRO | 37.5           | 48.2        |
| GROK-4-FAST    | 40.0           | 51.6        |
| GROK-4         | 43.4           | 46.8        |
| O4-MINI        | 46.6           | 43.8        |
| QWEN3-4B       | 55.6           | 33.5        |
| R1-QWEN3-8B    | 56.3           | 32.3        |
| QWEN3-235B     | 65.1           | 37.6        |
| DEEPSEEK-V3.1  | 70.2           | 48.4        |

(Petrov et al., 2025)



## Hands-on activity

# How to create your own research assistant

- GPTs (ChatGPT), Gems (Gemini), Projects (Claude)
- Assistant tailored to your topic/research question
  - Limited knowledge database and strict boundaries
- Knows what you are researching
- Knows seminal works in your field
- Decreases the level of hallucinations

The image shows a dark-themed configuration interface for creating a custom GPT. It includes the following sections:

- Name:** A text input field with the placeholder "Name your GPT".
- Description:** A text input field with the placeholder "Add a short description about what this GPT does".
- Instructions:** A large text area with the placeholder "What does this GPT do? How does it behave? What should it avoid doing?". Below the text area, a note states: "Conversations with your GPT can potentially include part or all of the instructions provided."
- Conversation starters:** A text input field with a close button (X) on the right.
- Knowledge:** A section with a note: "Conversations with your GPT can potentially reveal part or all of the files uploaded." and an "Upload files" button.

## Searching for literature



# Searching for literature



- You are familiar with manual searching:
  - Keywords and Boolean operators
- As a supplementary tool:
  - Finding additional literature
- You are familiar with the tool.
- You have a basic understanding of the problematics.



- You are not familiar with the sources searched:
  - What journals, databases?
- Tools have limited access to resources.
- You do not know how to use the tool (keywords/prompts/both?).
- Don't use as the only way of literature searching.

## How do we search for literature?

- Depends on what we want: articles (Google Scholar, Web of Science, Scopus ...), grey literature (repositories), books (libraries)? AI?
- **Why not use chatbots for literature searching?**

Hayes, S. C. (1992). Freud and Skinner: The unconscious in behavior analysis. *Journal of Experimental Psychology*, 45(3), 215–229.

### ★ AI Overview

The provided citation is for a 1992 article by S. C. Hayes titled "Freud and Skinner: The unconscious in behavior analysis," published in the *Journal of Experimental Psychology*. This paper, which is also available as [a PDF hosted by the Association for Contextual Behavioral Science](#), contrasts and compares the concepts of the unconscious as proposed by Freud and the behavioral perspectives of Skinner. It argues that while behavior analysis has been marginalized, it has actually evolved and is an active and growing field of research. 

Verbal Relations and the Evolution of Behavior Analysis

Steven C. Hayes

Linda J. Hayes

University of Nevada

# Searching for literature: “traditional” search X “semantic” search

## The “traditional” way

- Searching with keywords
- Using operators (AND, OR, NOT ...)
- Web of Science
- Very sensitive to wording
- Precise results (but knowing what you want is a must)

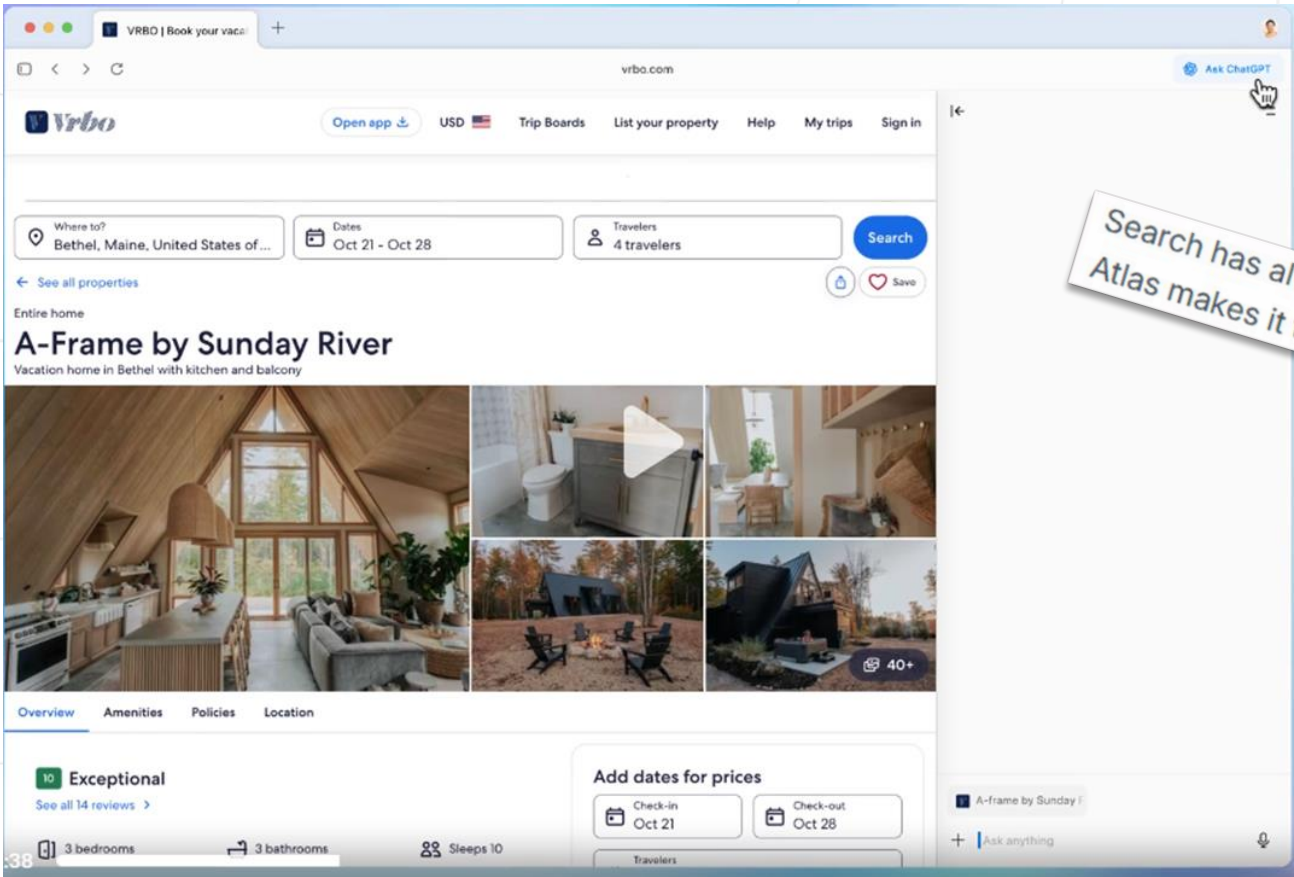


## “Semantic search”

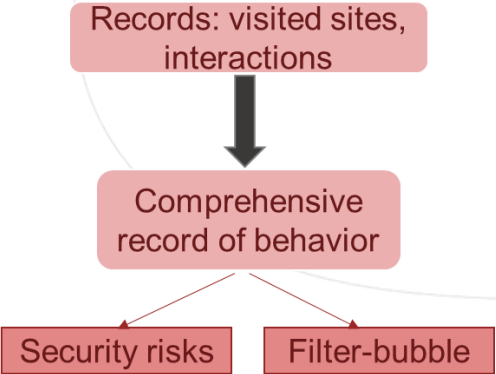
- Attempt to *understand* the meaning (AI-driven)
- Synonyms and related concepts
- Broader and less controllable results

# AI as search engine

## ChatGPT Atlas



Search has always been surveillance. AI search makes it intimate surveillance. Proton.me



- Tool to support literature search
- Citation analysis
- Transparent search
  - Keywords or questions
  - Additional filters
    - Year
    - Publication type
    - Specific journals (see covered journals [here](#))
    - Choose model (OpenAI, Anthropic)
- Highlights paraphrased section for a quick double-check

## Mapping literature



# Mapping literature

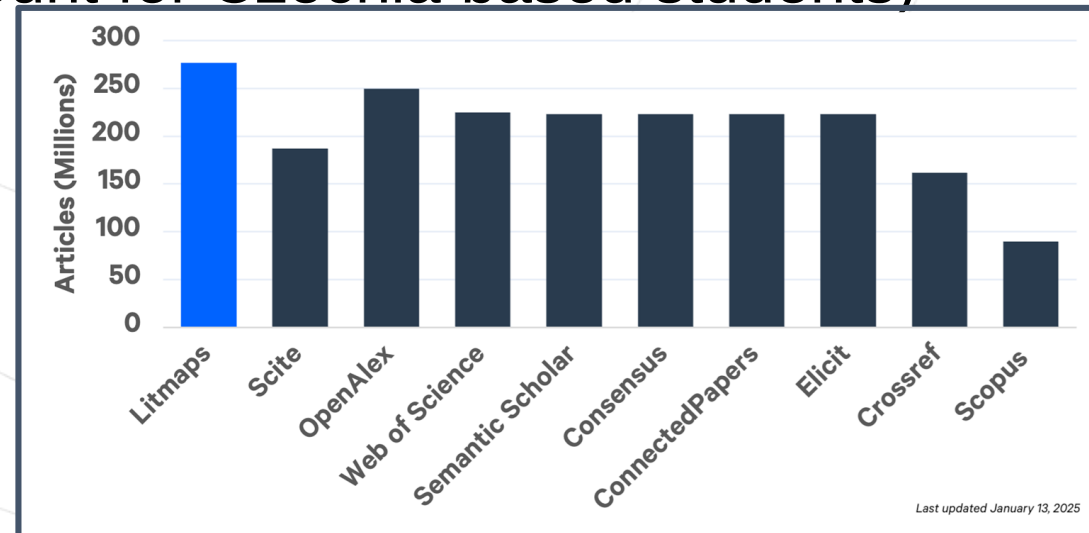


- After you have collected seminal literature.
- It can help navigate the field.
- It is great for broadening your literature:
  - Overlooked articles
- It is useful for reviews and literature visualization:
  - Connections between articles



- It should not be the first step in searching for literature.
- It can lead you to a rabbit hole:
  - Information bubble
- Tools have limited access to resources.
- It can reproduce highly cited articles.

- Searching with keywords or using semantic search
- Literature visualization
- Identification of research gaps
- Integration with citation managers
- Freemium (discount for Czechia-based students)



## Analyzing literature



# Analyzing literature



- Use it as a first glance at an article.
- Help explain a particular section or concepts.
- Learn using your own notes.
- Help with preparation for exams.

**AI is a good reader, but a poor thinker.**



- If you want to save time by not having to read the article.
- Don't use for a summary of your literature review.
- Don't use as replacement of deep reading.

Critical reading **cannot be replaced** by artificial intelligence.

For more reading tips go to NTK [Reading for writing guide](#).

- Research assistant developed by Google
- Uses Gemini as the engine
- Limited knowledge database dependent on uploaded sources
- Note-taking, text analysis, knowledge management, self-testing
- Free access (Google account needed)

# Writing thesis



## When (not) to use it?



- Planning stage: use it for brainstorming, gaps, viewpoints.
- It suggests language improvements (terminology, tense, tone, grammar).
- It provides critique and feedback (coherence, logic, structure).



- Planning stage: don't let it write the research project for you!
- It is not suitable for rewriting (to avoid plagiarism).
- When the tool starts reshaping your argument.
- When you are handling confidential, sensitive data.
- When you are unsure how to verify the accuracy of the output.
- When it is prohibited by your university.

# Jenni AI (How *not* to do it)

- “Writes it for you”
- Creates a bubble you can’t escape
- Citations that may or may not exist

Ivan Pavlov, a Russian physiologist, became famous for his experiments with dogs that led to the discovery of classical conditioning. He observed that dogs would begin to salivate not only when food was presented, but also when a neutral stimulus—such as the sound of a bell—was repeatedly paired with the food. This simple yet groundbreaking finding demonstrated how associations shape animal (and later human) behavior. Pavlov's research involved a meticulous examination of the factors influencing salivary flow in dogs, triggered by stimuli that had been repeatedly paired with food ([Dinsmoor 2004](#)). Pavlov's work extended beyond simple reflexes to explore the complexities of the nervous system ([Plaud 2003](#)). His experiments laid the groundwork for understanding how learning and experience can modify innate responses, [contributing](#) to the development of behaviorism as a major school of thought in [psychology](#) ([Barnett 1964](#)). His detailed methodology involved surgically diverting salivary ducts to accurately measure salivation, allowing for precise quantification of the conditioned response (Mazur 2015).

Accept



Try Again

Shift +



# Tools to support writing

 **DeepL**

Products

New

Solutions

Pricing

Apps

?

💡

Log

You're using the **free version** of DeepL Write. **Get maximum data security.** [Try Write Pro for free](#)

 **Translate text**  
100+ languages

 **Translate files**  
.pdf, .docx, .pptx

 **DeepL Write**  
AI-powered edits

English (British) 



Type or paste text to see ideas for improvement.

Click any word for alternatives or to rephrase a sentence.



Editing tools

 Corrections only



 Styles

None set 

 Show changes



Customizations

 Style rules

Pro

 Terms

51

- **Always** respect academic integrity and ethics:
  - Be transparent and honest,
  - Respect policies, guidelines and research participants.
- Keep your data secure.
- Be familiar with the tool:
  - Limitations, database, shortcomings.
- AI as a supportive tool, not a master:
  - You know your research better than the AI does.

# Thank you for your attention!

## Contact us:

[adam.urban@techlib.cz](mailto:adam.urban@techlib.cz)

[eliska.skladalova@techlib.cz](mailto:eliska.skladalova@techlib.cz)

## Please, fill out this feedback form



- Guide AI tools for research
- Guide Tools to support writing
- Tilburg.ai: Offers an overview of recommended tools and a large number of guides on how to use artificial intelligence for academic work.
- Newsletter for Early Career Researchers
  - English
  - Czech