

ChatGPT and other generative AI technologies

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CABTRAC Annual Retreat – October 23rd, 2023

Have you used ChatGPT?

- Ever?
- How did you use it?
 - Just for fun?
 - Admin work (e.g. draft an email or report)?
 - Summarize (e.g. lay abstract) or suggest a title for (your) original text?
 - Language editing or polishing?
 - Generate text for a manuscript or grant?
 - Generate (an) exam question(s)?

Basic Definitions

- Generative AI
 - Any AI system whose primary function is to *generate content*
 - *Distinct from* those that classify or group data
- Large Language Models (LLMs)
 - AI system that works with language; “*large*” part of the term describes the trend towards training language models with more parameters
 - *ChatGPT is powered by underlying LLM*



“Cancer cell immune interactions in Van Gogh style”



“A biological science laboratory painted in the style of Camille Pissaro”

If you are using ChatGPT, you're in growing company!

AI AND SCIENCE: WHAT 1,600 RESEARCHERS THINK

A *Nature* survey finds that scientists are concerned, as well as excited, by the increasing use of artificial-intelligence tools in research.

By Richard Van Noorden and Jeffrey M. Perkel

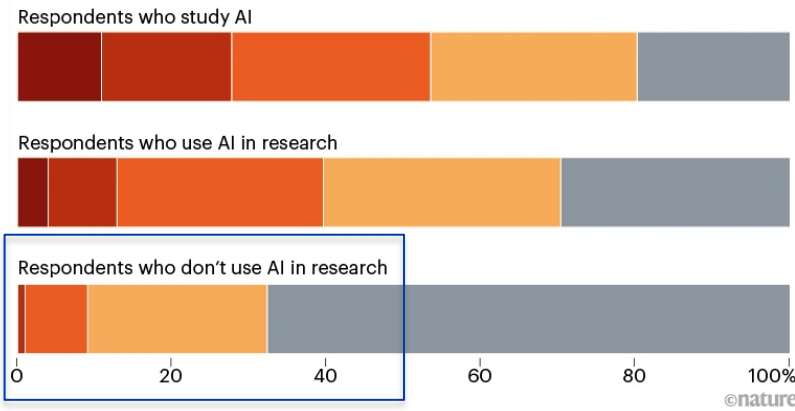
672 | Nature | Vol 621 | 28 September 2023

<https://www.nature.com/articles/d41586-023-02980-0>

USING GENERATIVE AI

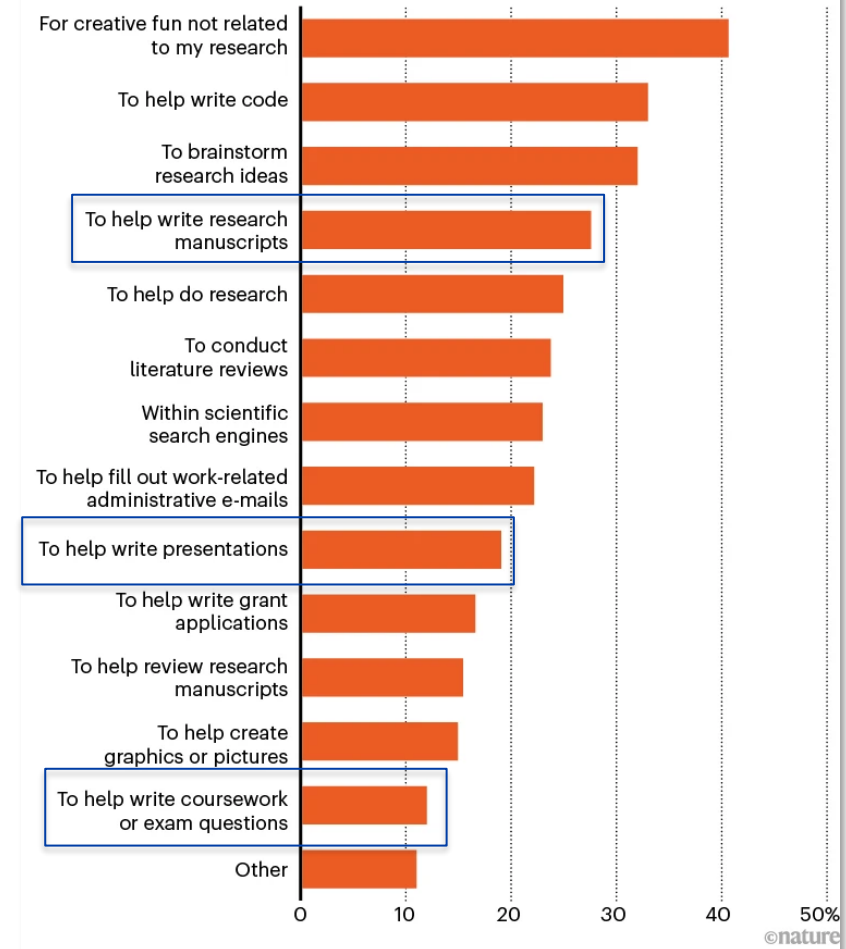
Q: How often do you use generative AI tools (such as ChatGPT) at work?

- I use them every day
- I use them more than once a week
- I use them occasionally
- I've used them only a few times
- Never



HOW RESEARCHERS USE LARGE LANGUAGE MODELS

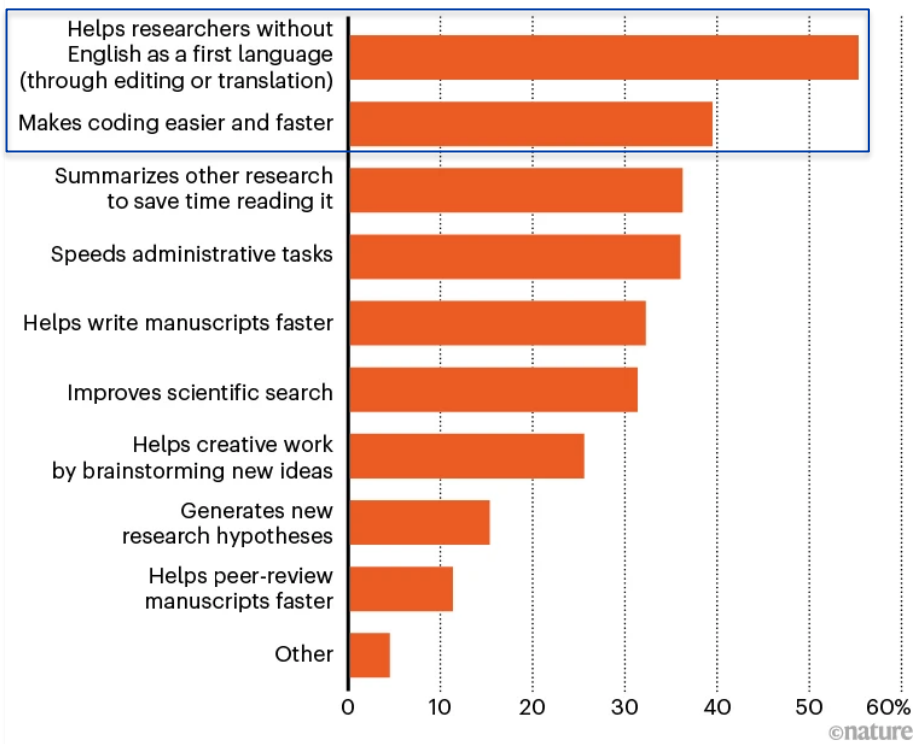
Q: What do you use generative AI tools (such as ChatGPT and other large language models) for? (Choose all that apply.)



Survey identified a range of pros and cons

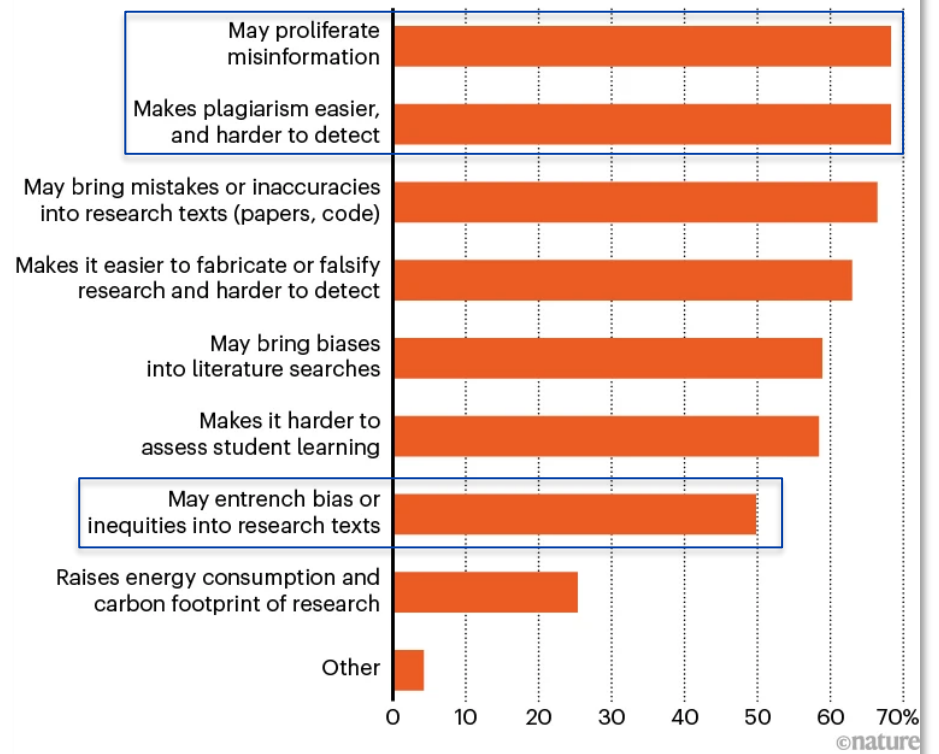
BENEFITS OF GENERATIVE AI

Q: What do you think are currently the biggest benefits of generative AI for research? (Choose all that apply.)



PROBLEMS OF GENERATIVE AI

Q: Where do you think generative AI may have negative impacts on research? (Choose all that apply.)



Postdoctoral scholars' use of ChatGPT

HOW CHATGPT IS TRANSFORMING THE POSTDOC EXPERIENCE

Roughly one-third of respondents to *Nature's* global postdoc survey use AI to refine text, write code or organize the literature. **By Linda Nordling**

How do we – the cancer biology training community – thoughtfully adapt and incorporate ChatGPT and other generative AI tools into research training?

<https://www.nature.com/articles/d41586-023-03235-8>

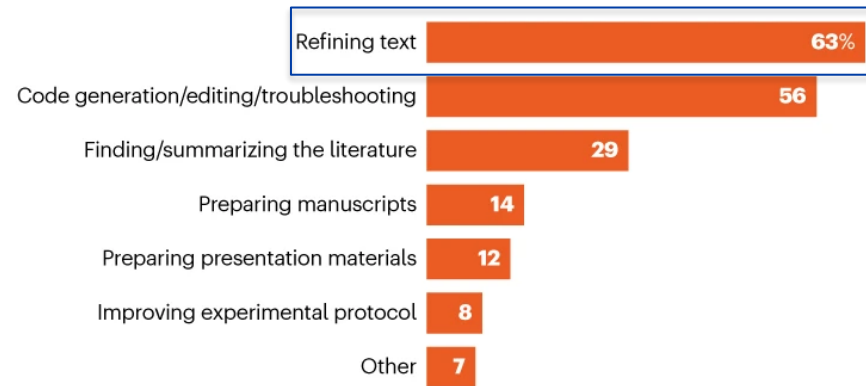
How has the evolution and rapid adoption of AI chatbots changed your day-to-day work or career plans, if at all?

31% Changed how I write papers | **22%** Changed how I analyse data | **17%** Changed how I stay up to date with the literature

Do you use AI chatbots, such as ChatGPT, in your work?



What do you use AI chatbots for?



How often do you use AI chatbots in your work?*



©nature

*Percentages don't add up to 100 owing to rounding.

Daniel Trusilo, PhD

- Postdoctoral Scholar, Halıcıoğlu Data Science Institute, UC San Diego
- PhD, University of St. Gallen
 - “Principles in Practice: Applied Ethics for Artificial Intelligence”
- Ethical and policy implications of emerging technology
 - Academia, humanitarian assistance, & military service

**Is it cheating
to use ChatGPT?**

VOTE HERE



choose integrity
choose to learn

integrity.ucsd.edu | @ucsdintegrity

Themes

1. Practical implications
2. Vague notions – “Transparency”
3. A very different example
4. Broad challenges

Practical Implications

Some basic considerations

- Ubiquitous
- Benefits & Harms
- Full lifecycle

How can problematic aspects of AI systems be accounted for?

Levels of transparency:

- User
- How was the tool trained?
- What is the tool doing?

What are the failure conditions?

- “Hallucinations” or confabulations
- Dated training
- Attribution

Values imbued

- Who’s notion of transparency?
- What is the system optimized for?

Real world example: ANYmal

ANYmal: Four-legged system designed to compete in the Defense Advanced Research Projects Agency (DARPA) subterranean challenge

Ethical Decision Framing - Aspect 21

Q: Does the system perform factual determinations whose results may frame the (ethical) decisions of users?

Training Data - Aspect 24

Q: Do operators have access to the training data?



Broad Challenges

Weighing benefits against harms is difficult

Principles are not practices

Interdisciplinary conversations are essential

Questions for discussion

- 1) How do we leverage the tools/capabilities available for a net positive outcome?
- 2) What information should be available to whom to ensure that systems are being used in a transparent way?
- 3) What level of transparency or accessibility of data sets, uses, and other information of AI tools should be considered necessary?

“ChatGPT is the technological embodiment of group think”

– Jennifer Egan

QUESTIONS FOR DAN?

Generative AI: framing the discussion for research training

- This piece discusses the issue more from a didactic/classroom training perspective

May 04, 2023

Getting a Grip on ChatGPT

Considering what academia got wrong about Wikipedia helps to crystallize the questions we should be asking about ChatGPT and our knowledge environments, Barbara Fister and Alison J. Head write.

Generative AI: framing the discussion for research training

- What level of transparency or accessibility of data sets, uses, and other information of AI tools should be considered necessary?

“**AlphaFold** – while its structural predictions are often highly accurate, the model’s intricate workings are not fully understood. The trade-off between model performance and interpretability raises questions about reproducibility and the applicability of such “black box” models in the scientific process.”

Generative AI: framing the discussion for research training

- This was the ChatGPT prompt for the AlphaFold example on the previous slide!



“Suggest ideas for discussion topics and case studies for a lab meeting to discuss the use of AI in science, and its challenges to scientific rigor and responsibility”



What do funding bodies and publishers say?

“NIH *prohibits* NIH scientific peer reviewers from using natural language processors, large language models, or other generative Artificial Intelligence (AI) technologies for analyzing and formulating peer review critiques for grant applications and R&D contract proposals.”

What do funding bodies and publishers say?

Cell Press instructions to authors

Disclosure instructions

Authors must disclose the use of generative AI and AI-assisted technologies in the writing process by adding a statement at the end of their manuscript. The statement should be placed in a new section after the 'Declaration of interests' section and the optional 'Inclusion and diversity' section, entitled 'Declaration of Generative AI and AI-assisted technologies in the writing process'.

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.

This declaration does not apply to the use of basic tools for checking grammar, spelling, references etc. If there is nothing to disclose, there is no need to add a statement.

One research ethicist's take...

Proposed policies for AI-generated text

Resnik and others from the editorial team at the Accountability in Research journal suggested the following new policy.

- Disclose and describe the use of any NLP systems in writing the manuscript text or generating ideas for the manuscript.
- Accept full responsibility for the text's factual and citation accuracy; mathematical, logical, and commonsense reasoning; and originality.
- Authors should specify who used the system, the time and date of the use, the prompt(s) used to generate the text, the sections(s) containing the text; and/or ideas in the paper resulting from NLP use.

In addition, the text generated by NLP systems should be submitted as supplementary material.

<https://www.tandfonline.com/doi/full/10.1080/08989621.2023.2168535>

<https://factor.niehs.nih.gov/2023/3/feature/2-artificial-intelligence-ethics>

Time for breakout groups!

- Has your training program set guidelines for generative AI use in research products?
- How would you incorporate discussions of generative AI into RCR training?
- ~5-minute discussion, then report out

Levels of transparency:

- User
- How was the tool trained?
- What is the tool doing?

What are the failure conditions?

- “Hallucinations” or confabulations
- Dated training
- Attribution

Values imbued

- Who’s notion of transparency?
- What is the system optimized for?

Thank You

Nature special collection: Science and the new age of AI

<https://www.nature.com/immersive/d41586-023-03017-2/index.html>

Example of (University of Michigan) guidelines for using generative AI for scientific research

<https://midas.umich.edu/generative-ai-user-guide/>