



SCIENTISTS NEED MORE

“king” – “man” + “woman” = ?

You can do Math with Words.

- WhatsApp – words + images =

- Bird – flying + swimming =



“hope” – “tree” + “silver” = ?

Why AI? How does AI affect the speed and quality of the output of knowledge workers?



The latest LLM from Open AI is more intelligent than the average human.



Holden Karnofsky,
<https://www.maximumtruth.org/p/massive-breakthrough-in-ai-intelligence>

The questions are
difficult
... at least for me.

Examples of o1's answers to IQ questions

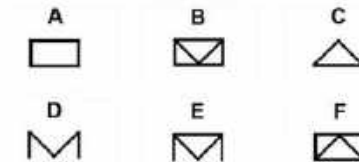
Here's the hardest question on the quiz, which it gets right:

Question #35

Exercise 35

| | | |
|---|---|---|
| ∨ | □ | ⋈ |
| ∩ | ▽ | ⋈ |
| — | ⋈ | ? |

Select answer

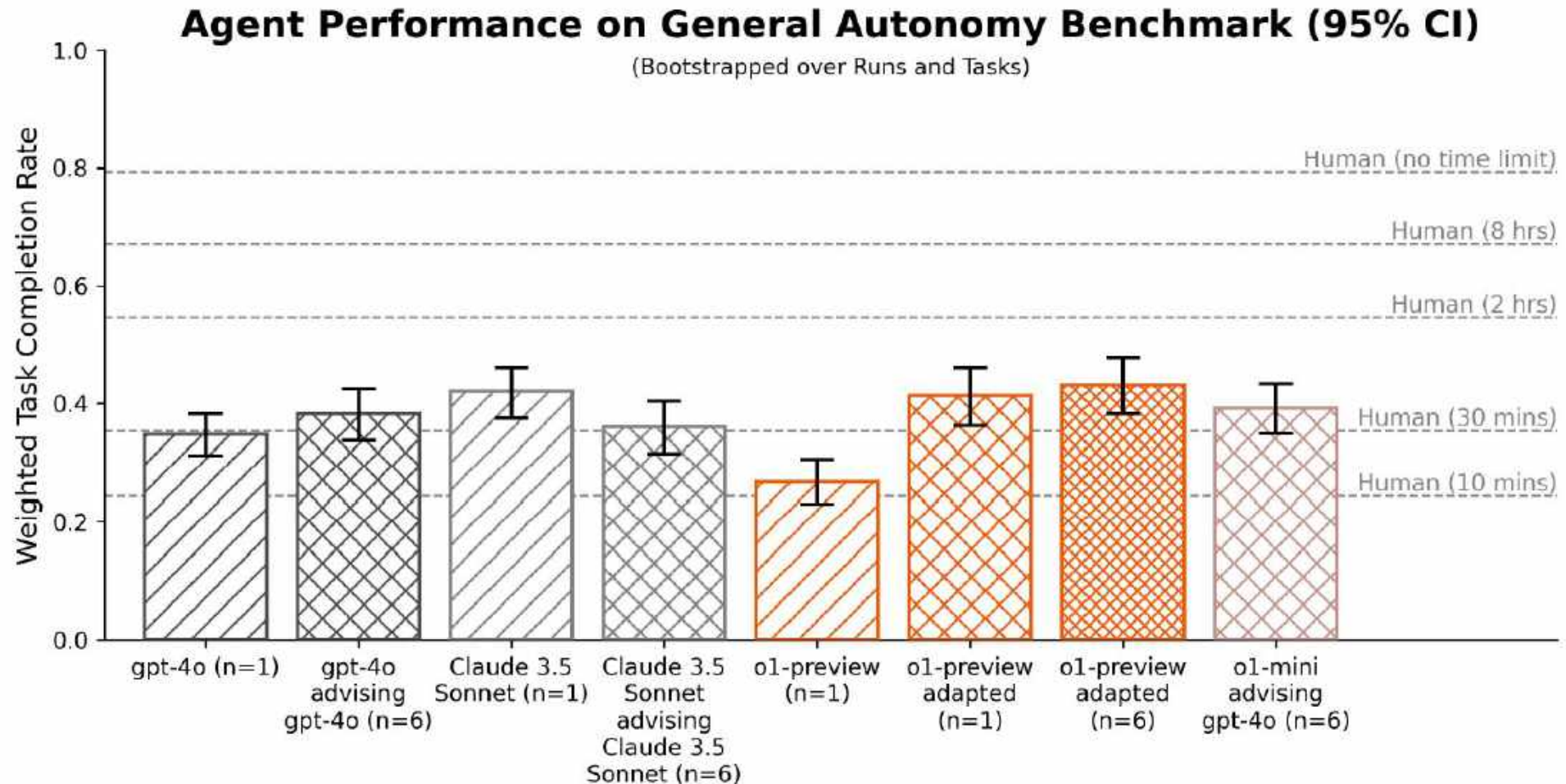


The correct answer is probably not obvious to you. It's certainly not obvious to me.

o1 gives this rationale:

Option D — By analyzing the patterns in the grid, we see that each column combines certain components to include all elements (∨, upside-down ∨, rectangle sides) by the third row. In the third column, components Rleft and Rright (the rectangle's sides) have not yet appeared. Therefore, the correct answer for the empty cell is Option D, which includes the normal 'v' and the two sides of the rectangle, completing the set of components for that column.

The best models can autonomously perform tasks.



A prospective study shows how much AI improves the speed and quality of the output of knowledge workers.

Navigating the Jagged Technological Frontier: Field Experimental Evidence of the Effects of AI on Knowledge Worker Productivity and Quality

Fabrizio Dell'Acqua
Edward McFowland III
Ethan Mollick
Hila Lifshitz-Assaf
Katherine C. Kellogg

Saran Rajendran
Lisa Kraymer
François Candelon
Karim R. Lakhani



Harvard
Business
School

What did they do?

- 759 Consultants from BCG
- three groups:
 - with no AI access,
 - GPT4 access and
 - GPT4 access with a prompt engineering overview.
- Performance baseline, then 18 different tasks (approx. 5hrs)
- Time measured speed
- Quality graded by 2 humans

Experimental Task

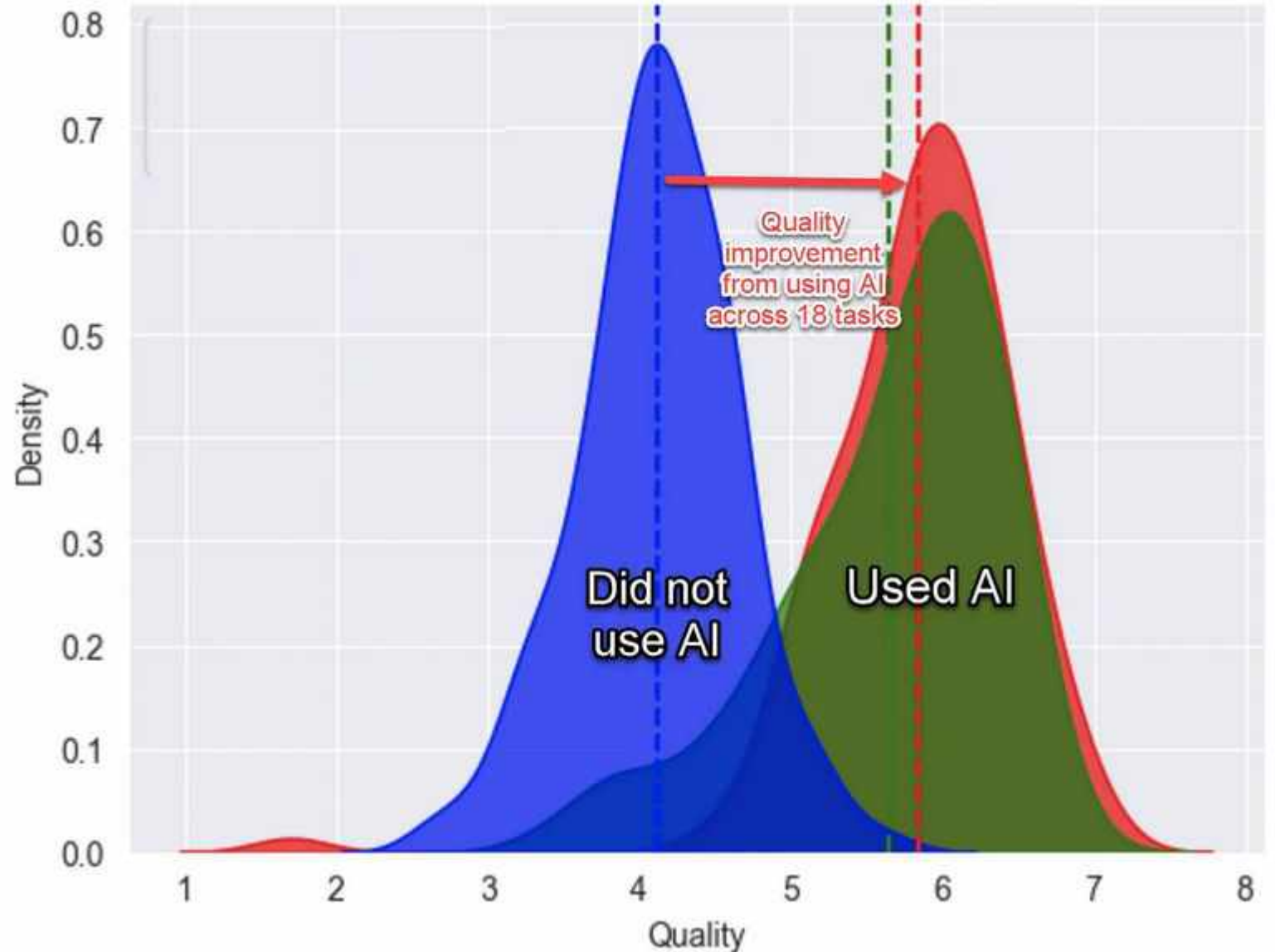
You are working for a footwear company in the unit developing new products. Your boss asked you to present an idea for a new product at the next manager's meetings. Please, respond to the questions below.

1. Generate ideas for a new shoe aimed at a specific market or sport that is underserved. Be creative, and give at least 10 ideas.
2. Pick the best idea, and explain why, so that your boss and other managers can understand your thinking.
3. Describe a potential prototype shoe in vivid detail in one paragraph (3-4 sentences).
4. Come up with a list of steps needed to launch the product. Be concise but comprehensive.
16. Explain the reasons your product would win this competition in an inspirational memo to employees.
17. Write marketing copy for a press release.
18. Please, synthesize the insights you have gained from the previous questions and create an outline for a Harvard Business Review-style article of approximately 2,500 words. In this article, your goal should be to describe your process end-to-end so that it serves as a guide for practitioners in the footwear industry looking to develop a new shoe. Specifically, in this article, please describe your process for developing the new product, from initial brainstorming to final selection, prototyping, market segmentation, and marketing strategies. Please also include headings, subheadings, and a clear structure for your article, which will guide the reader through your product development journey and emphasize the key takeaways from your experience. Please also share lessons learned and best practices for product development in the footwear industry so that your article serves as a valuable resource for professionals in this field.

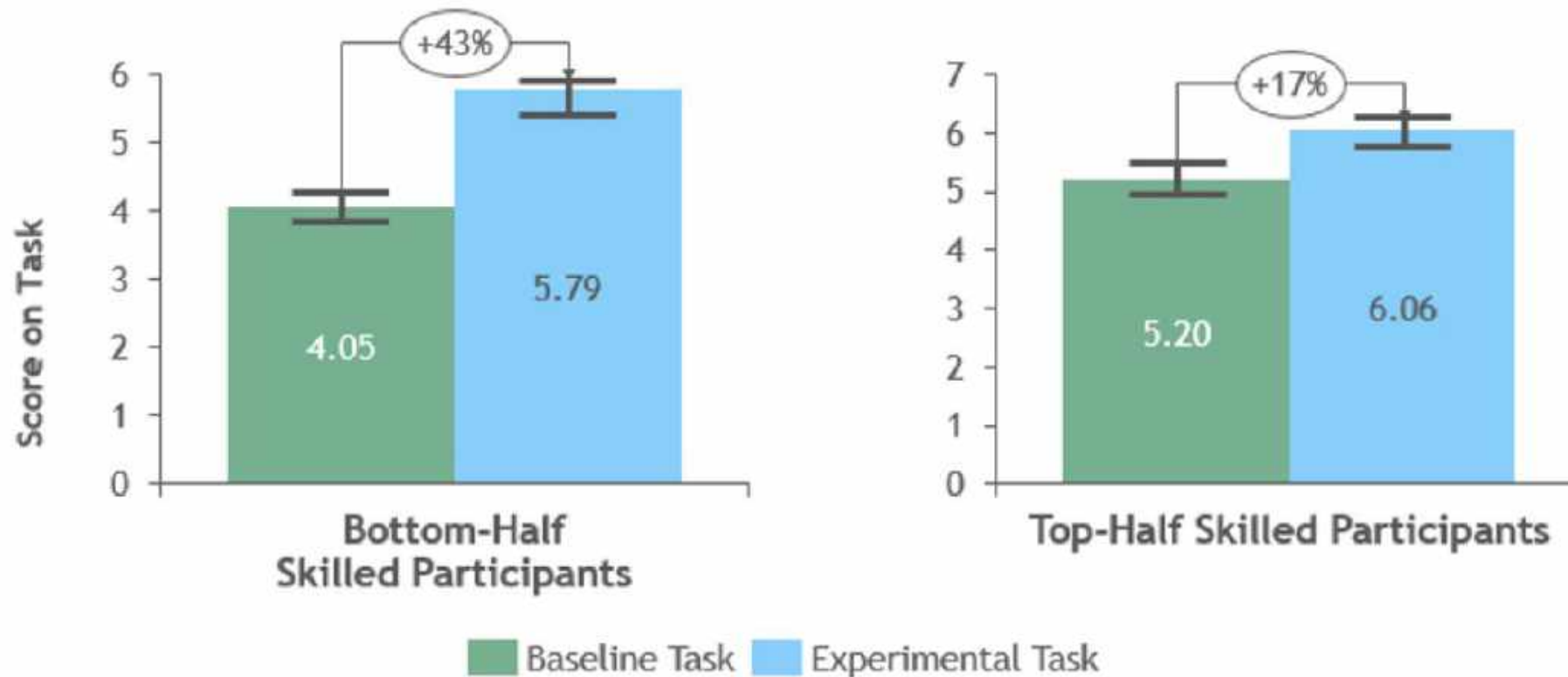
Not only were the AI users faster – they also delivered better quality!

With AI support

- 12.5% more of tasks were finished,
- Tasks were done 25.1% faster
- Tasks had 40% higher quality (!)



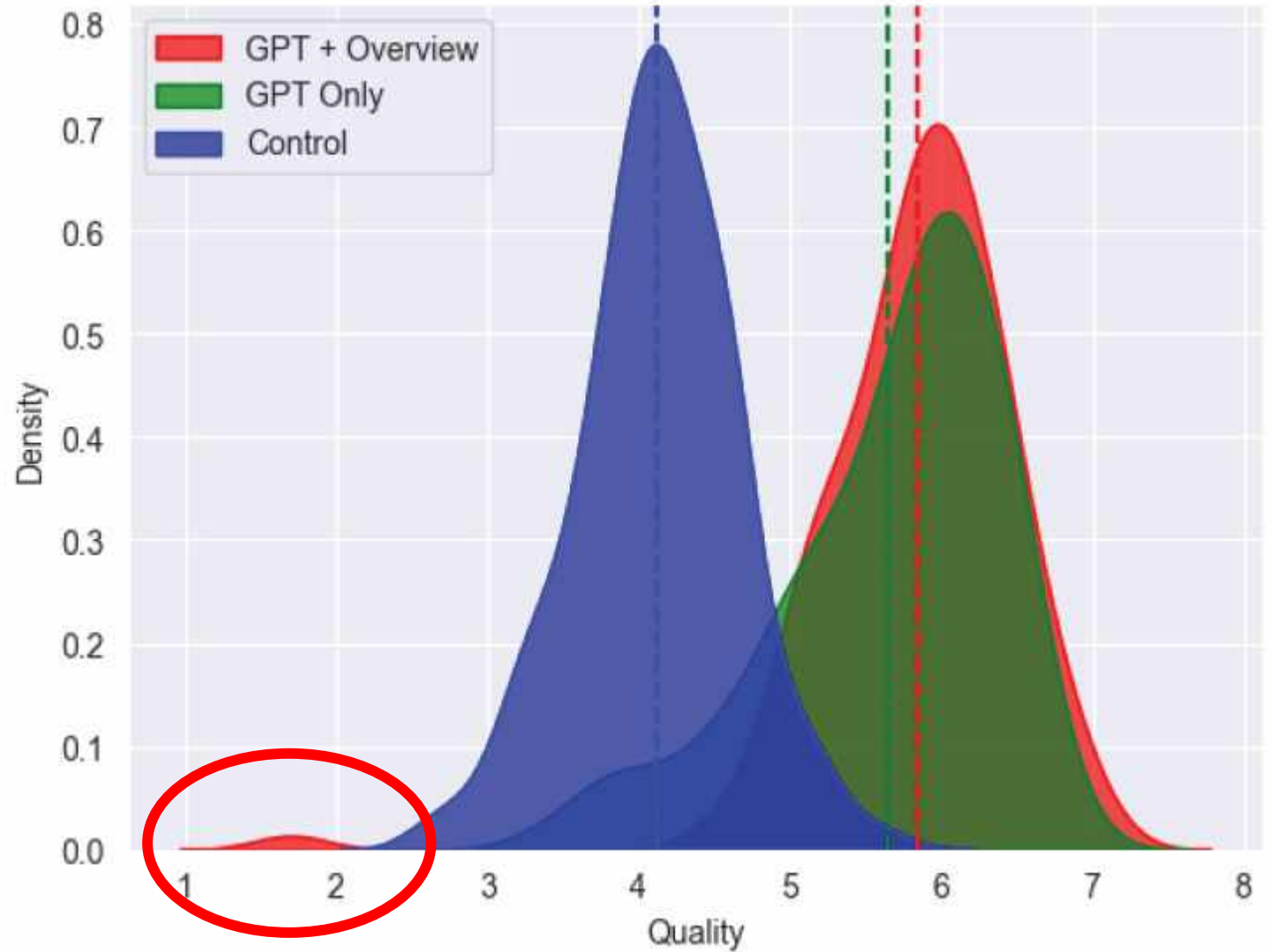
AI as equalizer:
The bottom half of consultants
profited more than the top ones.



... this is possibly because the consultants were not really trained in AI
 all were beginners.

Bad news:
1. people trust
AI too much.

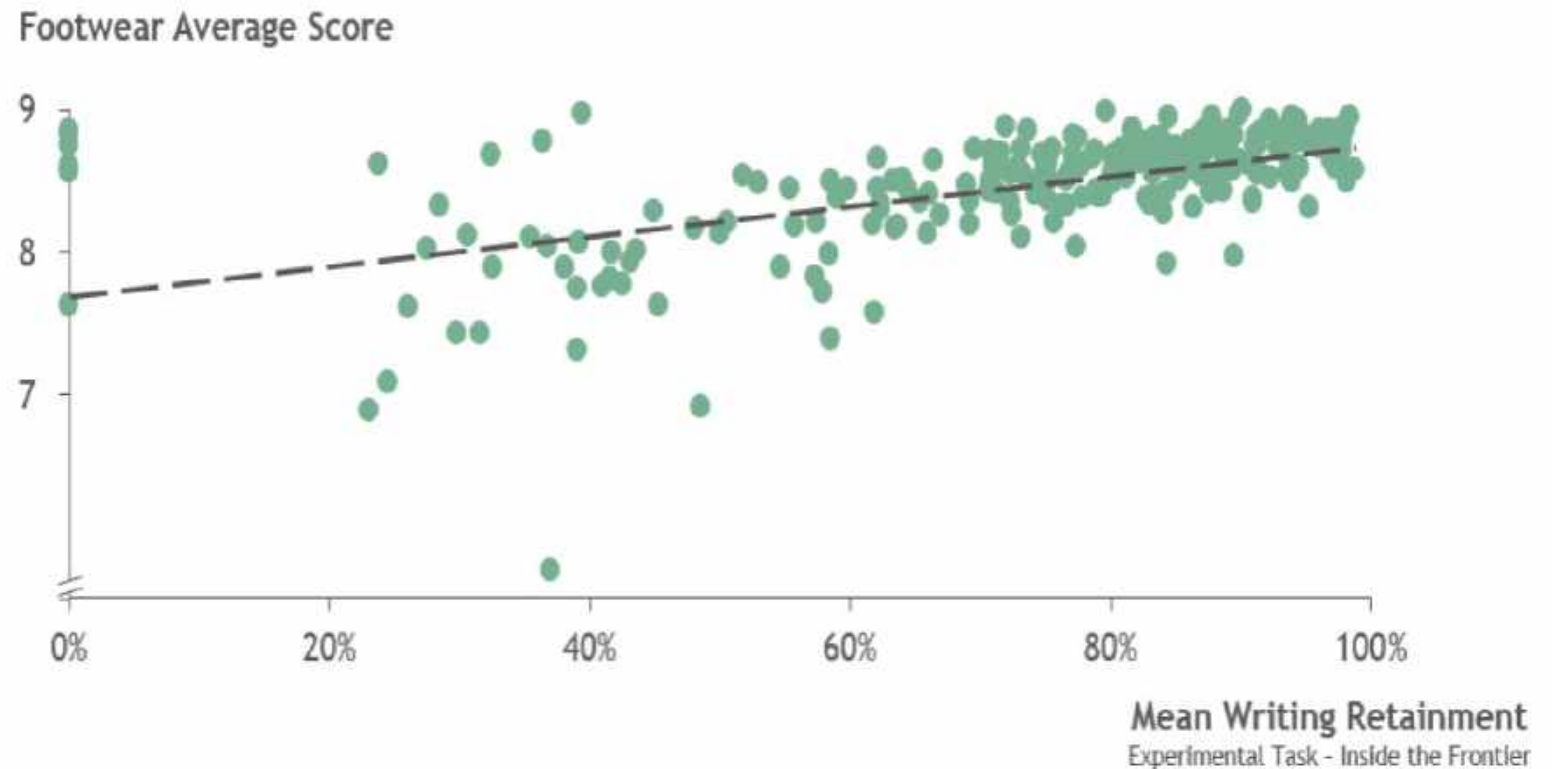
One task was
implemented that
was outside
possibilities of AI.
For this task, AI-using
consultants scored
worse.



Really bad news: 2. Human scorers found AI output to be of higher quality.

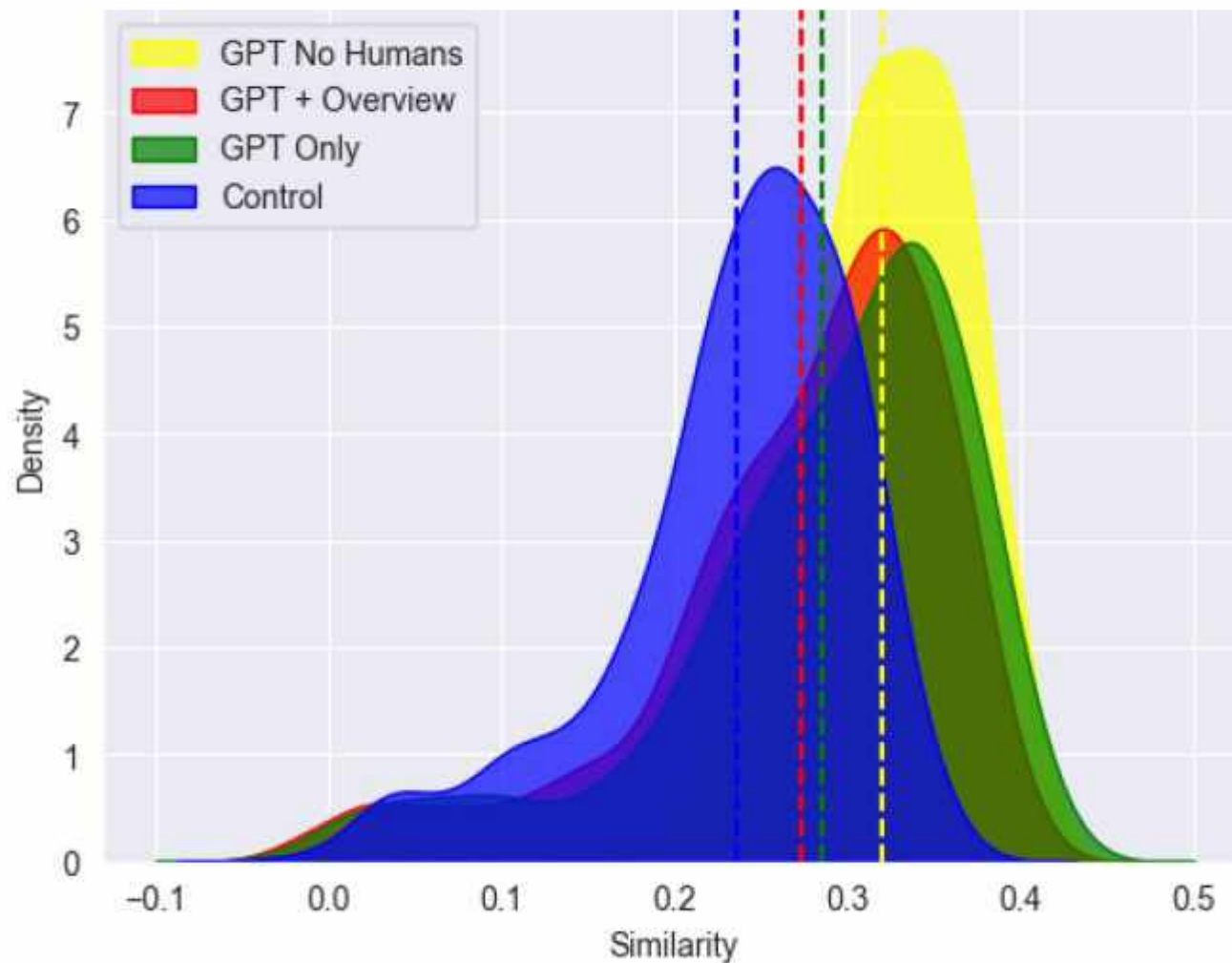
“Score” = Quality

“Retainment” =
how much AI
output was
retained by the
consultant in the
final product



Good news:
for heterogeneity,
we need non-AI
human output (or
other LLMs?)

Figure 6: Similarity across Participants



Why should Daniel give
this lecture to this audience?

mertens lab

mechanisms of leukemogenesis

home

projects

cooperation unit

university hospital
ulm



UNIVERSITÄTS
KLINIKUM
ulm

dkfz.



My professional life so far... and now.

- 101 publications in peer reviewed journals, cited 5861 times, h-index 40.
 - Latest two manuscripts written with AI support, one published.
- 22 grants, 6.8 Mio € total, also initiated and coordinated 3 large research consortia.
 - Latest three grants written with AI support.
- Have been training scientists in soft skills since 2011.
 - Since spring 2023 empowered 4319 participants in 94 workshops to use AI, and 80,4% will make implementation of AI into their everyday lives a high priority or the highest priority. (Almost) no more soft skill workshops without usage of AI.

The topics of the AI workshops I was asked to give cover a wide range ...

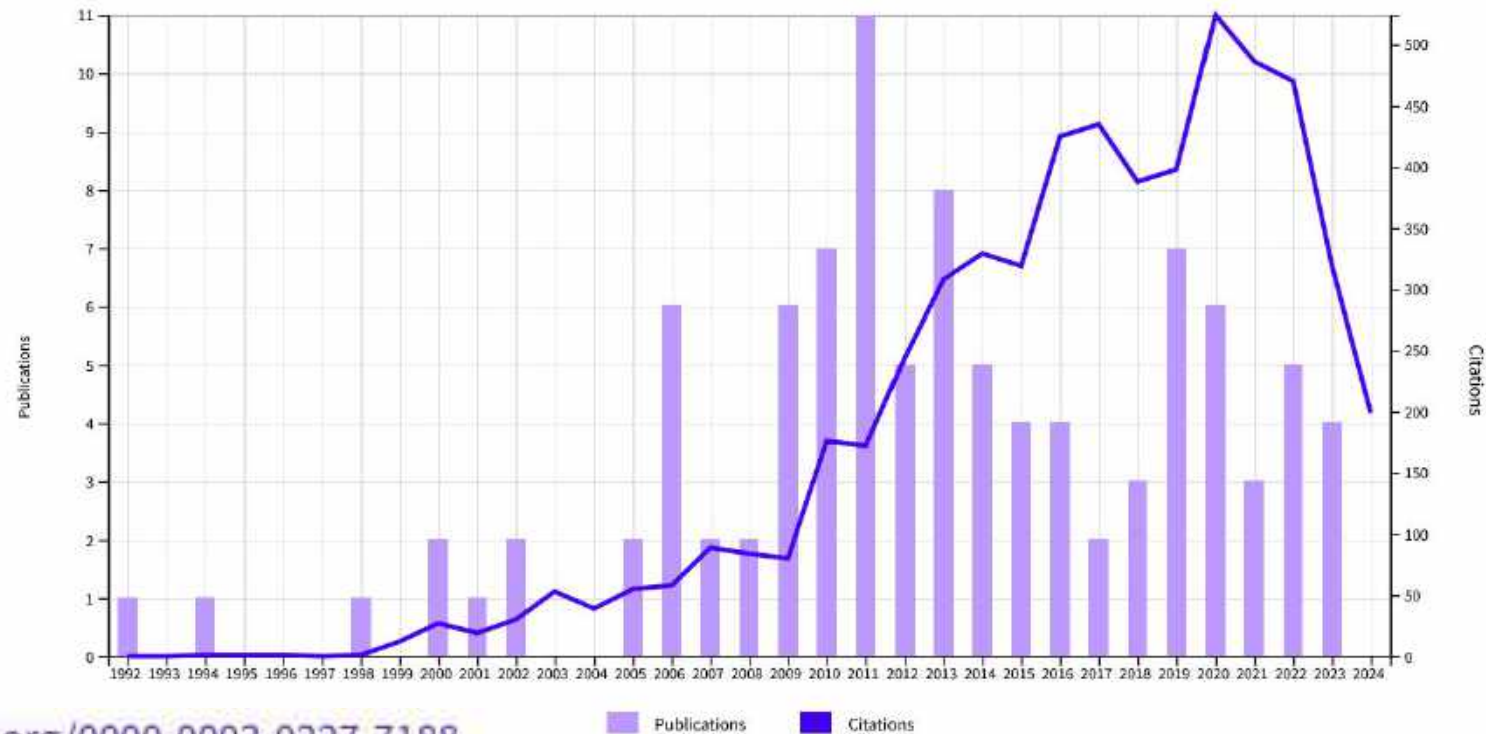
2. Workshop Categories (Sorted by Number of Workshops)

| Workshop Category | Number of Workshops | Total Participants |
|--|---------------------|--------------------|
| AI for Research Productivity | 15 | 839 |
| AI for Scientific Writing and Publishing | 12 | 963 |
| AI in Specific Scientific Fields | 8 | 682 |
| AI for Career Development | 6 | 249 |
| Introductory AI Workshops | 4 | 361 |
| AI for Project and Time Management | 4 | 97 |
| Specialized AI Applications | 3 | 227 |
| AI in Education and Teaching | 2 | 81 |
| Advanced AI Topics | 2 | 38 |
| AI Ethics and Best Practices | 2 | 67 |

The Mertens Lab is Active.



Times Cited and Publications Over Time



<https://orcid.org/0000-0003-0227-7188>

Publons is part of

A Clarivate Analytics company

Daniel Mertens - Third Party Funding

Daniel Mertens Third Party Grant Funding

| Funding Body | Start | End | Title | Funding (Euro) | |
|------------------------------------|-------|-----|---------|--|-------------------------|
| DJCLS | 2004 | - | 2007 | Functional characterization of the tumorsuppressormechanism in 13q14.3 | 295.000.- Euro ** |
| Tumorzentrum HD/Mannheim | 2005 | - | 2008 | Significance of chromosomal and centrosomal aberrations in multiple myeloma | 322.500.- Euro ** |
| DJCLS | 2006 | - | 2009 | Role of microRNA genes in the pathomechanism of CLL | 183.200.- Euro * |
| Deutsche Krebshilfe | 2006 | - | 2009 | Collaboration of genomic and epigenetic mechanisms in chromosomal band 13q14.3 in CLL | 510.800.- Euro |
| EU Marie Curie Training Network | 2006 | - | 2010 | Chromatin structure and plasticity | 247.800.- Euro * |
| DKFZ Intramural Funding Scheme | 2007 | - | 2008 | Regulation of cytokines by microRNAs | 85.300.- Euro * |
| Helmholtz Alliance Systems Biology | 2007 | - | 2010 | Modeling NFkB- and JAK-STAT signalling pathways in hematopoietic and leukemia/lymphoma cells | 300.300.- Euro ** |
| Wilhelm-Sander Stiftung | 2010 | - | 2012 | The epigenetic Tumorsuppressormechanism in 13q14 | 141.300.- Euro * |
| Krebshilfe | 2011 | - | 2013 | Characterization of the cellular and molecular mode of action of immunomodulatory drugs in CLL | 106.400.- Euro * |
| Virtual Helmholtz Institute | 2011 | - | 2016 | Understanding and overcoming resistance to apoptosis and therapy in leukemia | 440.000.- Euro § |
| BMBF | 2012 | - | 2015 | CancerEpiSys | 282.500.- Euro # |
| DJCLS | 2012 | - | 2017 | Identification of an epigenetic signature predicting response to | 148.200.- Euro ** |
| | | | therapy | 678.400.- Euro ** | |
| | | | in CLL | 80.000.- Euro ** | |
| BMBF | 2016 | - | 2019 | Pretherapeutic Epigenetic CLL Patient Stratification | 405.000.- Euro & |
| Deutsche Krebshilfe | 2016 | - | 2019 | lange nicht-kodierende RNAs, MicroRNAs und Diagnostik von ZNS-Lymphomen | 353.400.- Euro * |
| European Union (ERA-NET) | 2016 | - | 2019 | Translational research on human tumour heterogeneity to overcome recurrence and resistance to therapy, (FIRE-CLL) | 256.200.- Euro * |
| DJCLS | 2017 | - | 2019 | Interaction of CLL cells with their non-malignant microenvironment | 210.300.- Euro |
| DFG | 2017 | - | 2020 | Extracellular Vesicle RNA as modulators of the tumor microenvironment in B-cell lymphomas | 508.000.- Euro ** |
| DFG SFB 1074 | 2020 | - | 2024 | Detecting genomic and epigenetic clonal evolution and Richter transformation and microenvironmental interaction in CLL | 516.200.- Euro * |
| Krebshilfe | 2021 | - | 2024 | NOTCH1 activity is postt dysregulated in leukemia | ro * |
| EU-WIDERA | 2023 | - | 2027 | Accelerating ERA by Sh: and Environment | ro |
| TOTAL | | | | | 6.774.545.- Euro |

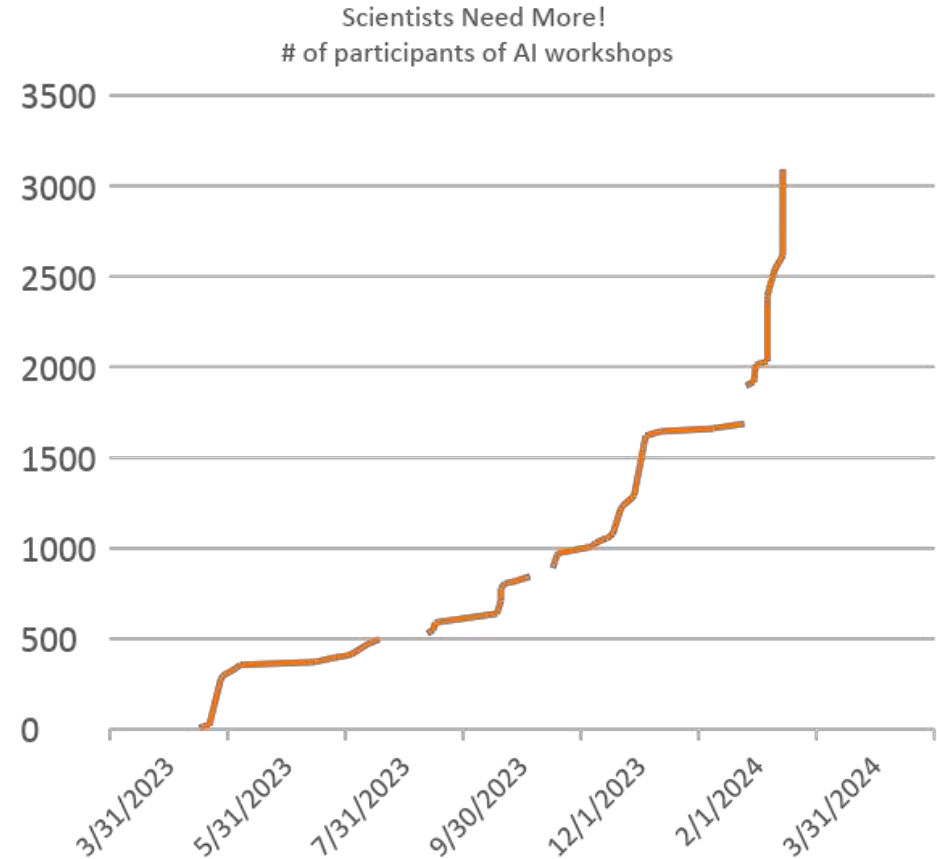
* acting as co-applicant (50%) , ** acting as co-applicant (33%),
§ acting as coordinator (11 members, 3.7 Mio€ total), # acting as coordinator (8 members, 2.9 Mio € total)
& acting as coordinator (8 members, 2,7 Mio€ total)

* acting as co-applicant (50%) , ** acting as co-applicant (33%),
§ acting as coordinator (11 members, 3.7 Mio€ total), # acting as coordinator (8 members, 2.9 Mio € total)
& acting as coordinator (8 members, 2,7 Mio€ total)

Last year I did a lot of workshops to

empowerpeopleAI

- 54'
 - 314 s.
 - 80. e into
- imp into
EVERYDAY LIVES
Align AI
a high priority or the
highest priority.
bit.ly/80000hrs_AI

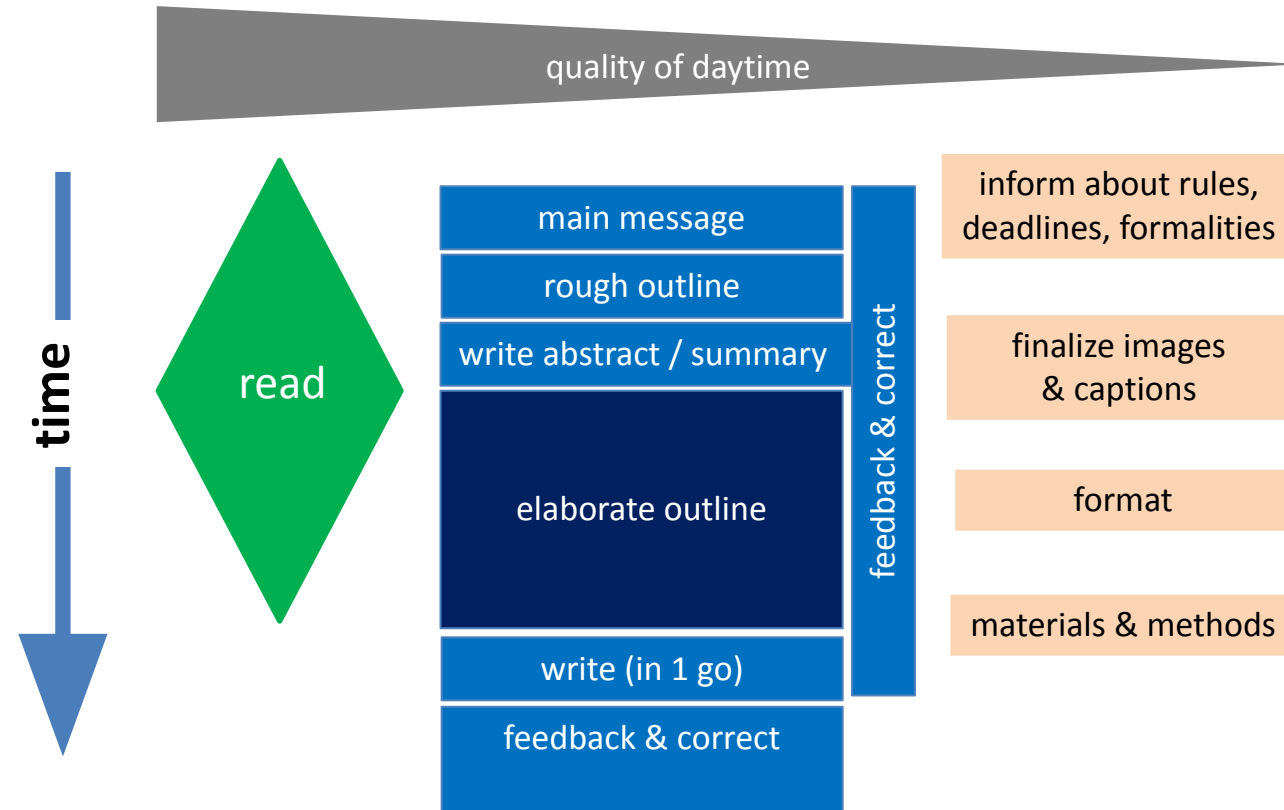


SCIENTISTS NEED MORE

How can AI help you for your everyday professional lives?

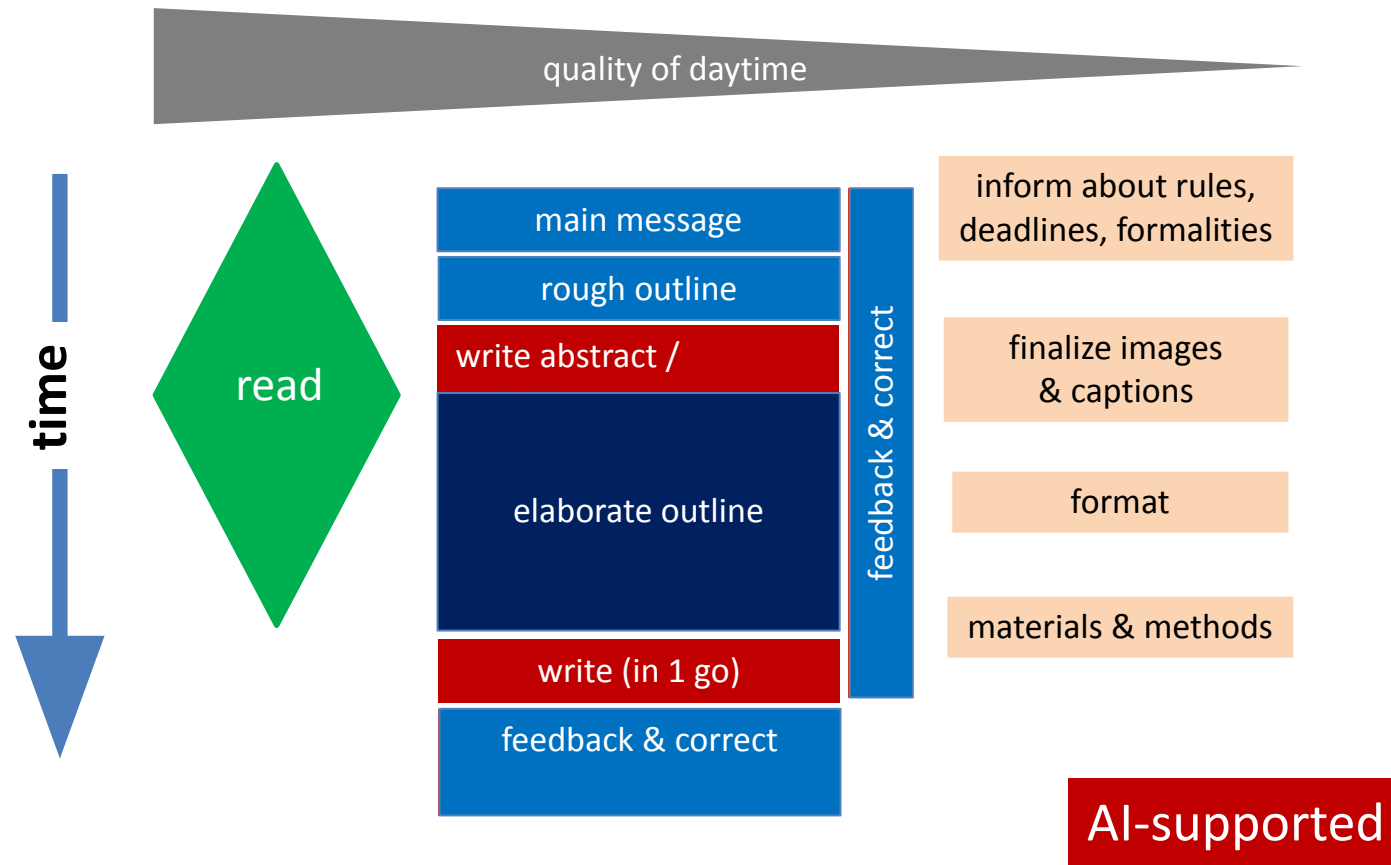
| What | How | Why |
|----------------------------|---|---|
| Introduction | | |
| | magic of words | Why use AI? |
| | why me | What is my own experience with LLMs? |
| How to use AI | | |
| | 2 tools wAy prompting | You only need Perplexity / Bing Chat and ChatGPT How to use frameworks for prompting |
| Implementation | | |
| literature review | | AI Tools for literature review, what is possible. |
| brainstorming | a scientific project, universal prompt | major aim, workpackage content, timeline, project management, SMART, SWOT, Gantt |
| texting | writing a manuscript, a grant | Outline, citations, texting |
| data analysis | | From a table to analyses |
| image analysis | | From a figure to experimental setup optimizing a graphical abstract |
| Introspection | | |
| examples for introspection | decision making, creativity, negotiation | mega prompts from influencers |
| Future | | |
| data protection | local LLMs | implementing a local LLM |
| possible future scenarios | perspective from machine learning experts | Where will the development of AI go? What should we do? |

How I have done writing so far... (a thesis, a manuscript, a grant application)



Adapted from San Francisco Edit

AI will give you lots of support for reading and texting...



The LLMs can write really well.

Liebe Alena,

vielen Dank für das Teilen des Manuskripts. Leider konnte ich es nur überfliegen, finde die Daten aber interessant. V.a. ist es wirklich gut geschrieben, beginnend mit der Einleitung bis zur Diskussion.

Viel Erfolg beim Einreichen!

Liebe Grüße

Eugen

writing the discussion of the notch1 tp53 and mir34 paper v9

upregulation.

To further explore the kinetics of miR-34a induction by p53, we treated TP53 wt cell lines (WA-OSEL and EHEB) extended time points (24, 48, and 72 hours). We observed a significant upregulation of miR-34a expression at treatment (Figure 1B), indicating a sustained p53-mediated induction of miR-34a over time.

Next, we directly manipulated p53 levels in WA-OSEL (TP53 wt) and MEC-1 (TP53 mut) cells by transfection with plasmid or a p53-targeting shRNA. In MEC-1 cells, p53 overexpression significantly increased miR-34a levels, had no effect (Figure 1C). In contrast, p53 manipulation did not significantly alter miR-34a expression in WA due to the already high basal levels of miR-34a in this TP53 wt cell line.

Taken together, our results indicate that p53-mediated regulation of miR-34a expression is particularly important in TP53 wt cell lines.

2. miR-34a overexpression of inhibition does not significantly affect notch1 protein levels or signaling activity in CLL cell lines

Having established that miR-34a modulates NOTCH1 signaling, we used luciferase reporter assays to confirm that miR-34a targets the 3' UTR of NOTCH1 mRNA. Overexpression of miR-34a in CLL cells significantly reduced luciferase activity in the presence of the NOTCH1 3' UTR reporter, while no effect was observed with the empty vector control. These findings suggest that miR-34a directly targets NOTCH1 mRNA, providing a potential mechanism for the modulation of NOTCH1 signaling in CLL.

3. miR-34a overexpression of inhibition does not significantly affect notch1 protein levels or signaling activity in CLL cell lines

04-Jul-2024

Ref: The NOTCH1 and miR-34a signaling Network is affected by *TP53* Alterations in CLL

Dear Mrs. Alena Ehrmann,

Your manuscript entitled "The NOTCH1 and miR-34a signaling Network is affected by *TP53* Alterations in CLL" you submitted to Leukemia and Lymphoma, has been reviewed. The reviewer comments are included at the bottom of this letter.

The reviews are in general favourable and suggest that, subject to minor revisions, your paper could be suitable for publication. Please consider these suggestions, and I look forward to receiving your revision.

When you revise your manuscript please highlight the changes you make in the manuscript by using the track changes mode in MS Word or by using bold or coloured text.

Please note that the Journal requires all authors provide a fully completed ICMJE Form for Disclosure of Potential Conflicts of Interest along with their submitted article. This is a compulsory requirement for all manuscript submissions. It is the responsibility of the corresponding/submitted author to collate together their own disclosure form along with each author's disclosure forms and upload these online as an "ICMJE Disclosure Form" file.

Please make sure a separate disclosure form is uploaded for EACH author listed on your manuscript. For example, if there are 6 authors, 6 disclosure forms are required. A copy of the ICMJE Form for Disclosure of Potential Conflicts of Interest is attached to this letter.

potential regulation of NOTCH1 by miR-34a. of miR-34a modulation on NOTCH1

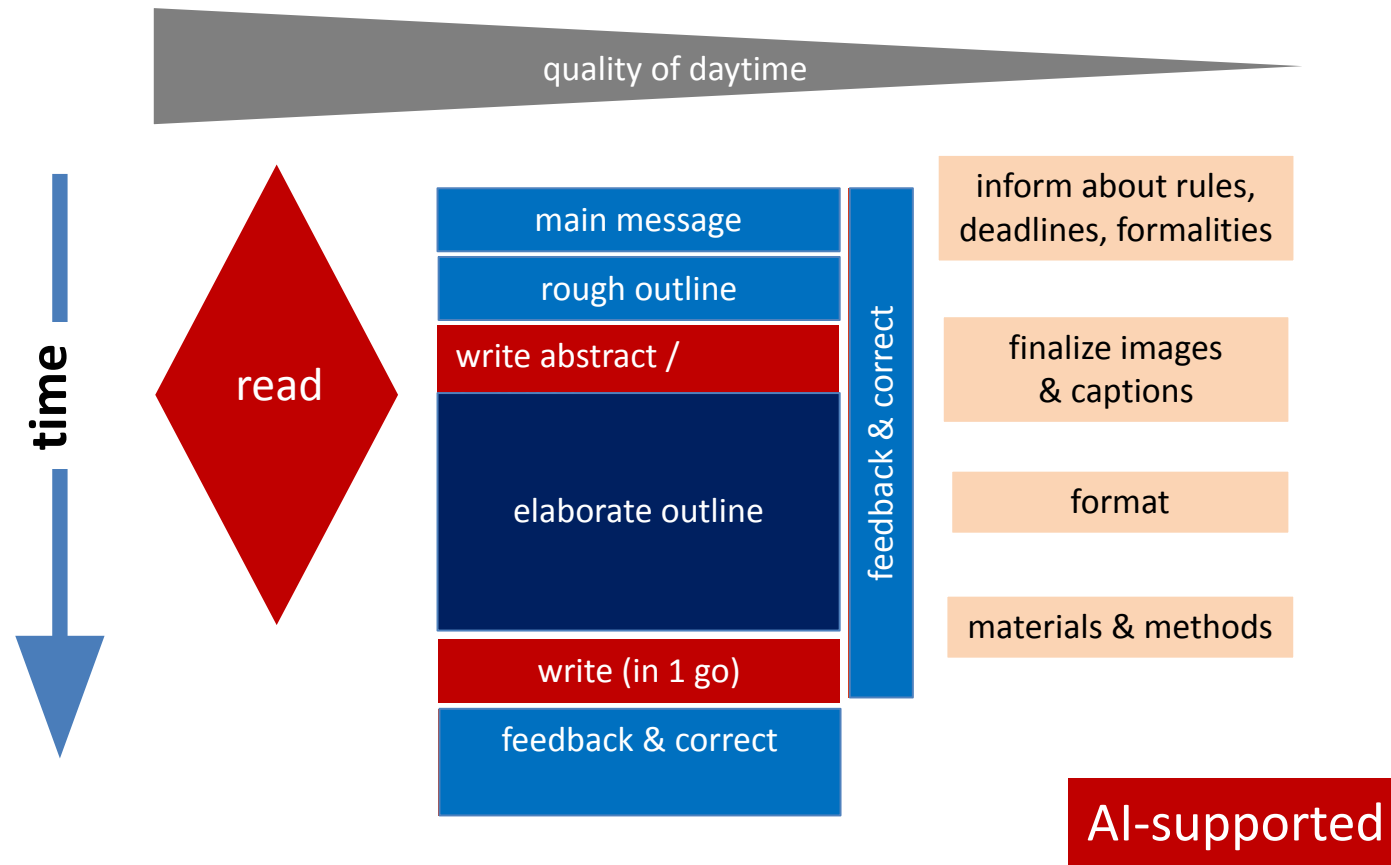
pathway connected to the p53. Manuscript is well written and provides new interesting view on important aspect of CLL pathogenesis.

I have some minor comments:

UTR, providing a potential mechanism for

Claude 3 Opus (Anthropic).

AI will give you lots of support for reading and texting...



AI assistants objectify literature review.

Insight from top 5 papers =

English (en) Saved

NOTCH1 and TP53 play crucial roles in chronic lymphocytic leukemia (CLL) progression and chemo-refractoriness [3]. While both genes are known to independently drive disease development, their interaction in CLL remains significant. Studies have shown a parallel occurrence of NOTCH1 mutations and TP53 defects in CLL patients [5], with a potential connection between inherited sensitivity to ionizing radiation caused by TP53 mutations and CLL development [1]. Furthermore, the presence of distinct subclones harboring mutations on different alleles of TP53 suggests a complex mutational landscape in CLL, influenced by treatment regimens [5]. Understanding the interplay between NOTCH1 and TP53 mutations is essential for elucidating the mechanisms underlying CLL pathogenesis and guiding personalized treatment strategies for patients.

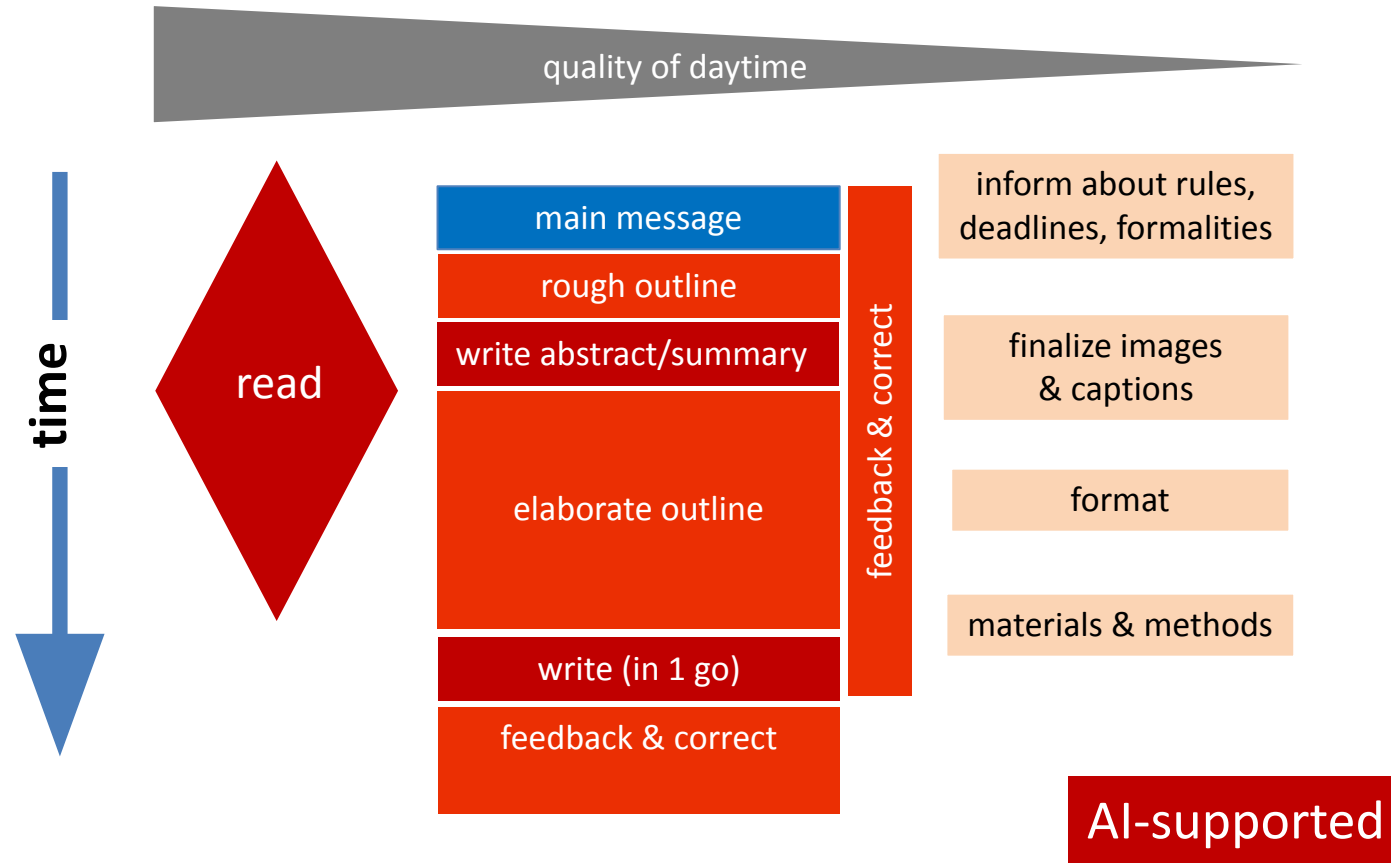
Related Questions: [What are the molecular mechanisms of Notch1 in CLL?](#)

PDF Open Access Top-tier papers [More filters](#)

Sort by: Relevance

| Papers (10) | Insights | Limitations | cohort size | Compare papers with more columns |
|---|---|--|---|---|
| <p><input type="checkbox"/> Open access · Journal Article · DOI</p> <p><input type="checkbox"/> The spectrum of tp53, sf3b1, and notch1 mutations in chronic lymphocytic leukemia patients exposed to ionizing radiation due to the chernobyl npp accident.</p> <p>N I Bliou +6 more 01 Dec 2018</p> <p>1 Citations <input type="button" value="Ask Copilot"/></p> | <p>In CLL, TP53 mutations are more prevalent than NOTCH1 mutations. TP53 mutations can co-occur with SF3B1 mutations, while NOTCH1 mutations are less frequent in CLL patients exposed to ionizing radiation.</p> | - | <ul style="list-style-type: none"> Main group: 106 CLL patients exposed to ionizing radiation. Control group: 130 CLL patients not exposed to ionizing radiation. | <p><input type="button" value="Add custom column"/></p> <p>or select from the suggestions below.</p> <ul style="list-style-type: none"> + TLDR + Conclusions + Summarized Abstract + Results + Summarized Introduction + Methods Used + Literature Survey + Contributions + Practical Implications + Objectives + Findings + Research Gap + Future Research + Dependent Variables + Independent Variables + Dataset |
| <p><input type="checkbox"/> Open access · Journal Article · DOI</p> <p><input type="checkbox"/> Relevance of TP53 for CLL diagnostics</p> <p>Mark Catherwood +5 more 01 May 2019 · Journal of Clinical Pathology</p> <p>9 Citations <input type="button" value="PDF"/> <input type="button" value="Ask Copilot"/></p> | <p>Not addressed in the paper.</p> | <ul style="list-style-type: none"> Current screening methods may miss diagnostically relevant mutations. Less sensitive techniques may fail to detect clinically relevant mutations. | - | |
| <p><input type="checkbox"/> Open access · Journal Article · DOI</p> <p><input type="checkbox"/> Single cell analysis revealed a coexistence of NOTCH1 and TP53 mutations within the same cancer cells in chronic lymphocytic leukaemia patients.</p> <p>Barbara Kartorová +15 more 01 Sep 2017 · British Journal of Haematology</p> <p>5 Citations <input type="button" value="PDF"/> <input type="button" value="Ask Copilot"/></p> | <p>NOTCH1 and TP53 mutations coexist in the same CLL cells, potentially contributing to disease progression and chemo-refractoriness, with implications for Richter's syndrome development.</p> | <ul style="list-style-type: none"> No significant difference in overall survival or time to treatment. Clonal heterogeneity and therapy-related clonal evolution observed. | <ul style="list-style-type: none"> Cohort size: 282 CLL patients 193 untreated, 89 TP53mutated (48 treated) patients | |
| <p><input type="checkbox"/> Open access · Journal Article · DOI</p> <p><input type="checkbox"/> p53 and Notch signaling in chronic lymphocytic leukemia: clues to identifying novel therapeutic strategies.</p> | <p>Notch signaling is a downstream target of p53 in CLL. Their interaction may influence apoptosis regulation, suggesting a potential therapeutic target for novel strategies in CLL treatment.</p> | <p><input type="button" value="Compare papers"/> Comparing p53 pathway require alternative treatment.</p> <ul style="list-style-type: none"> Conventional cytotoxic agents depend on | - | |

...and AI will give you lots of support in brainstorming.



Certainly! I'd be happy to review your manuscript and provide suggestions for modifications, focusing on the meta-level aspects such as the underlying concepts, the introduction, and the discussion section. Please provide me with the manuscript, and I'll carefully read through it.

When reviewing your manuscript, I will pay attention to the following:

1. Underlying concepts: I will assess whether the key concepts are clearly defined and consistent throughout the manuscript.

2. Introduction: I will evaluate if the introduction effectively sets the stage for the study.

2. The results section does not provide a clear mechanistic explanation for the observed positive correlation between p53 and NOTCH1 in CLL. While the data demonstrate that p53 activation or overexpression increases NOTCH1 protein levels and signaling activity, the underlying molecular mechanisms driving this relationship remain unclear. Further exploration of the direct or indirect regulatory pathways connecting p53 and NOTCH1 would strengthen the study's conclusions.

3. The clinical relevance of the findings is not fully explored in the results section. Although the study demonstrates a correlation between TP53 status, NOTCH1 levels, and miR-34a expression in CLL patients, the functional consequences of these alterations on disease progression, treatment response, or patient outcomes are not addressed. Incorporating clinical data or discussing the potential implications of the findings for CLL management would enhance the translational impact of the study.

Experimental and detailed critiques:

1. The results section lacks information on the efficiency of p53 overexpression or knockdown in the transfection experiments. Without quantitative data on the level of p53 modulation achieved, it is difficult to assess whether the observed effects on miR-34a and NOTCH1 are truly dependent on p53 levels. Including qPCR or western blot data to demonstrate the extent of p53 overexpression or knockdown would strengthen the validity of the findings.

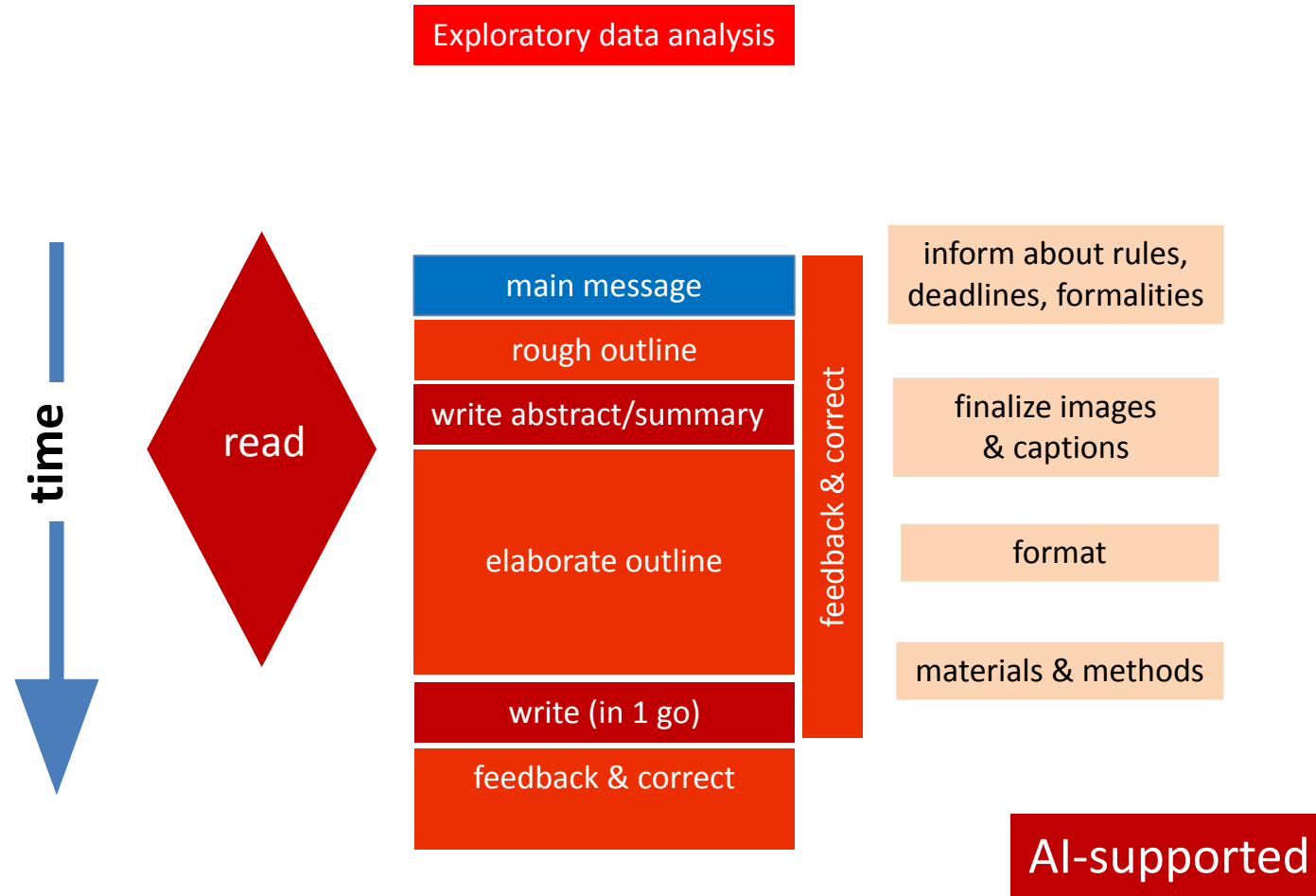
2. The study uses a limited number of CLL cell lines, with only one TP53 mutant cell line (MEC-1) and two TP53 wild type cell lines (WA-OSEL and EHEB) for most experiments. Given the heterogeneity of CLL and the potential variability in cellular responses, the inclusion of additional cell lines with diverse genetic backgrounds would enhance the robustness and generalizability of the findings. Additionally, the use of primary CLL cells from patients with different TP53 statuses would provide a more clinically relevant context for the observed effects.

3. The results section does not include detailed information on the statistical analyses performed

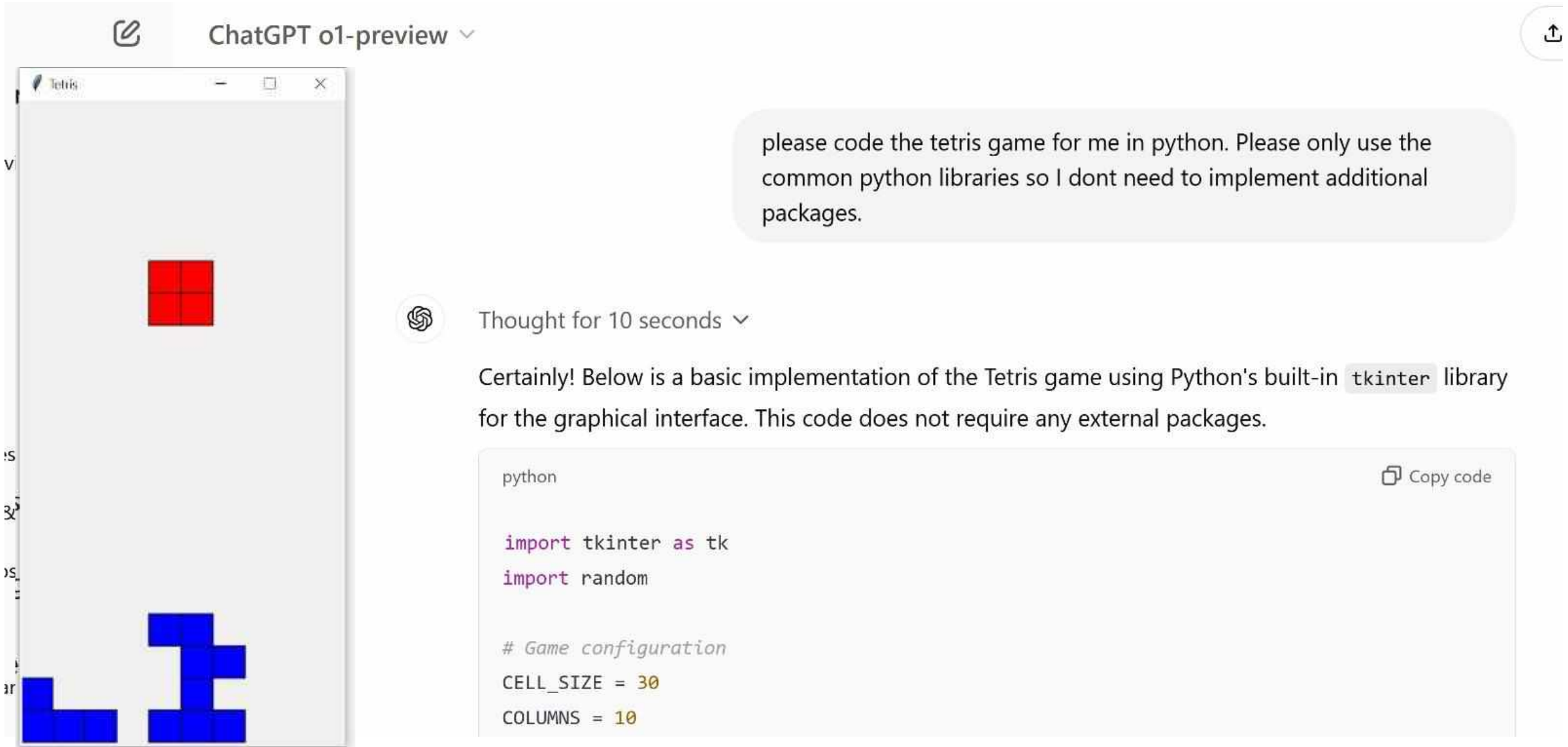
The LLMs are
excellent in
providing external
perspective.

Claude 3 Opus (Anthropic).

But you can use AI to brainstorm on data analysis.



GPTo1 can do one-shot coding.



The image shows a screenshot of a ChatGPT o1-preview chat window. On the left, there is a window titled 'tetris' displaying a Tetris game. The game board is 10 columns wide and 20 rows high. A red 2x2 square piece is currently in the air, positioned in the center. At the bottom of the board, there are two blue pieces: an L-shaped piece on the left and a T-shaped piece on the right. The chat interface shows a user prompt on the right and a response on the left. The response includes a code block for a Python implementation of the Tetris game using the tkinter library.

ChatGPT o1-preview

please code the tetris game for me in python. Please only use the common python libraries so I dont need to implement additional packages.

Thought for 10 seconds

Certainly! Below is a basic implementation of the Tetris game using Python's built-in `tkinter` library for the graphical interface. This code does not require any external packages.

```
python

import tkinter as tk
import random

# Game configuration
CELL_SIZE = 30
COLUMNS = 10
```

Copy code

External perspective also objectifies data analysis.

what is this data about?



Let's start by examining the contents of the uploaded Excel file to understand what the data is about. I'll load the file and provide a summary of its contents.

The uploaded Excel file contains data with the following columns:

- `group`: Identifier for different groups within the dataset.
- `volume`: A numerical value, possibly indicating the volume of something (units aren't specified).
- `pressure`: A numerical value for pressure (units aren't specified), likely corresponding to the volume.
- `pressure_sd`: Standard deviation of the pressure measurements, indicating variability.
- `diameter`: Another numerical measurement, possibly of an object or entity related to the volume and pressure (units aren't specified).
- `diameter_sd`: Standard deviation of the diameter measurements, also indicating variability.

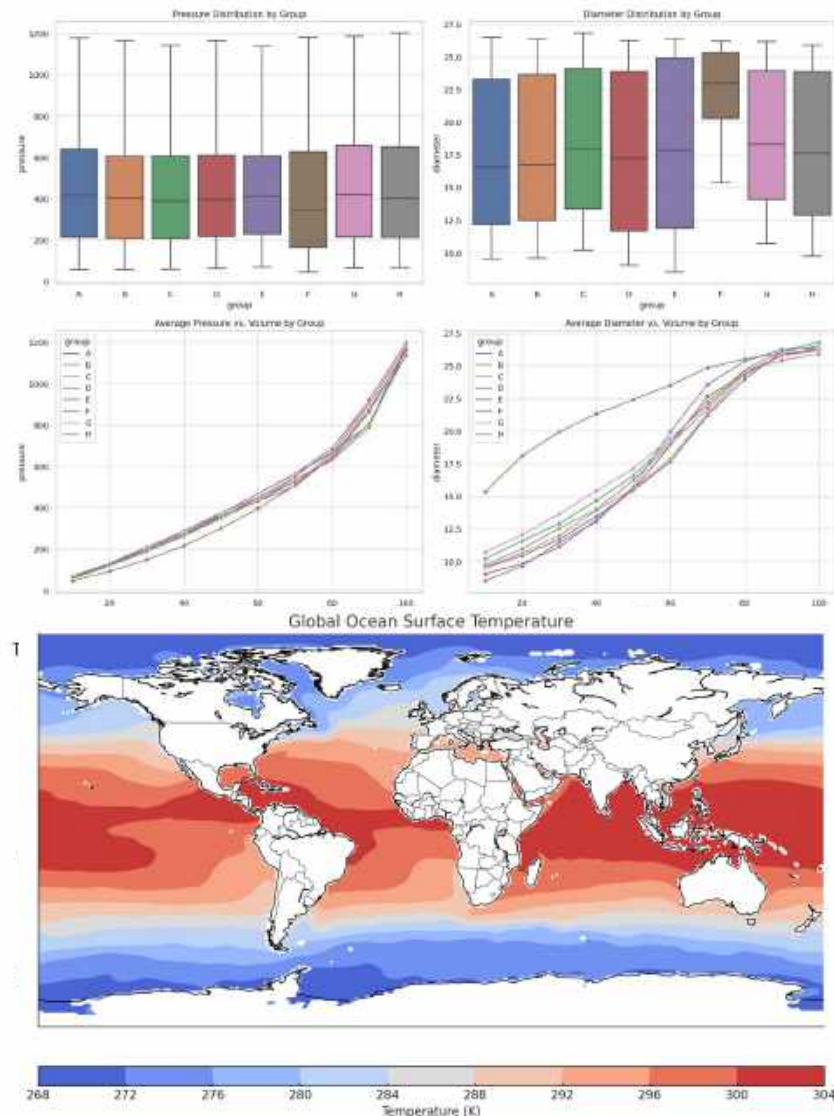
It appears this data might be used to analyze the relationship between volume and other physical properties like pressure and diameter, potentially within different groups labeled as 'A', 'B', etc. This could be experimental data from a scientific study, for example, examining how an increase in volume affects pressure and diameter under different conditions (grouped by 'group'). [-]

what kind of analyses would make most sense with this dataset?

5. **Error Analysis:** Analyzing the standard deviations (`pressure_sd` and `diameter_sd`) to understand the variability and reliability of the measurements. This could involve comparing the variability across different volumes or groups.
6. **Visualization:**
 - **Line plots** of pressure and diameter against volume could visually illustrate how these properties change with volume.
 - **Box plots or violin plots** to compare the distribution of pressure and diameter across different groups.
 - **Scatter plots** to visually inspect the relationship between volume, pressure, and diameter, possibly using color coding to distinguish between groups.
7. **Cluster Analysis or Principal Component Analysis (PCA):** If the dataset is large and complex, these methods can help identify patterns or groupings within the data that might not be immediately obvious, such as identifying subgroups within the larger groups based on their response patterns.

Analyses and visualizations allow informed decisions.

Let's start with these visualizations.



4. Average Diameter vs. Volume by Group: The trend for diameter versus volume is also

The visualizations provide the following insights into how the groups compare:

1. **Pressure Distribution by Group:** The box plots for pressure distribution show that different groups may have varying median pressures, and the spread (interquartile range) also differs. This suggests that the relationship between volume and pressure might differ

```
Analysis [X]
python Always show details [ ] Copy code
import matplotlib.pyplot as plt
import seaborn as sns

# Setting the visual style
sns.set(style="whitegrid")

# Plotting the distribution of pressure and diameter for each group
fig, axes = plt.subplots(2, 2, figsize=(16, 12))

# Pressure distribution by group
sns.boxplot(ax=axes[0, 0], x='group', y='pressure', data=data)
axes[0, 0].set_title('Pressure Distribution by Group')

# Diameter distribution by group
sns.boxplot(ax=axes[0, 1], x='group', y='diameter', data=data)
axes[0, 1].set_title('Diameter Distribution by Group')

# Average pressure vs. volume for each group
sns.lineplot(ax=axes[1, 0], x='volume', y='pressure', hue='group')
axes[1, 0].set_title('Average Pressure vs. Volume by Group')

# Average diameter vs. volume for each group
sns.lineplot(ax=axes[1, 1], x='volume', y='diameter', hue='group')
axes[1, 1].set_title('Average Diameter vs. Volume by Group')

plt.tight_layout()
plt.show()
```

This is good!

Great to hear that was helpful! If there's anything more you'd like to explore or any other analyses you want to perform, let me know!

that sound pretty cool. Lets try to do that. What kinds of analyses could we do to simulate an ecosystem?

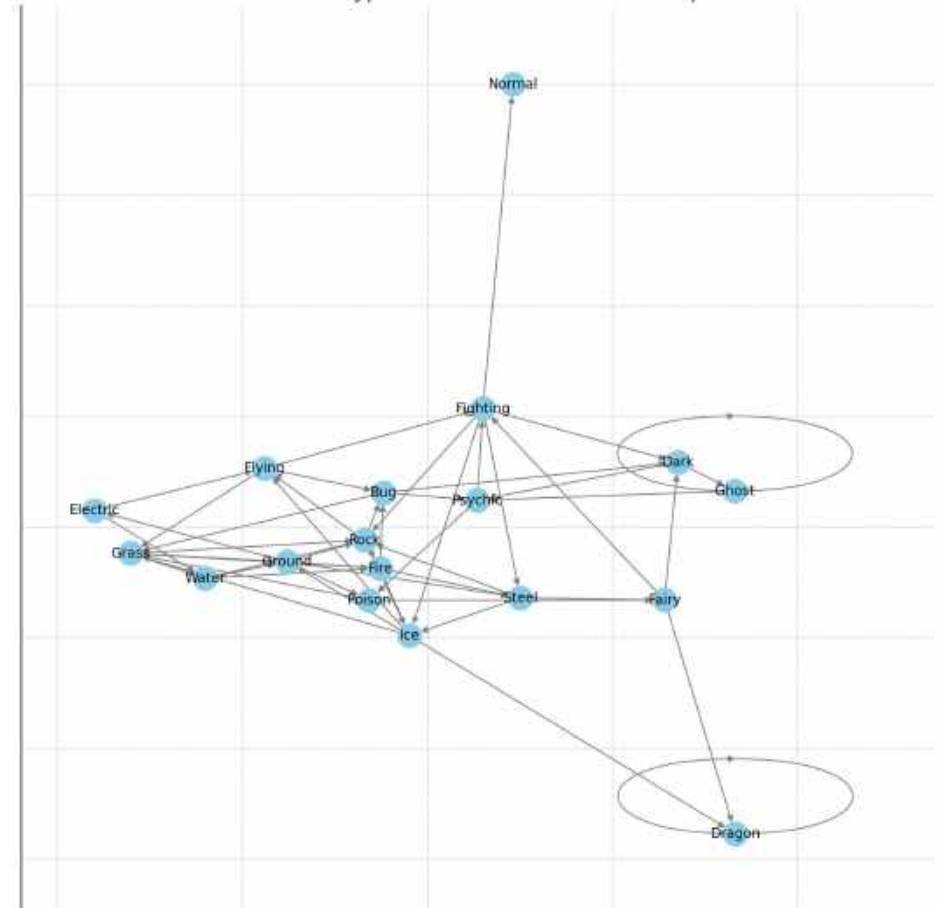


To simulate an ecosystem using the Pokémon dataset, we can employ various analyses:

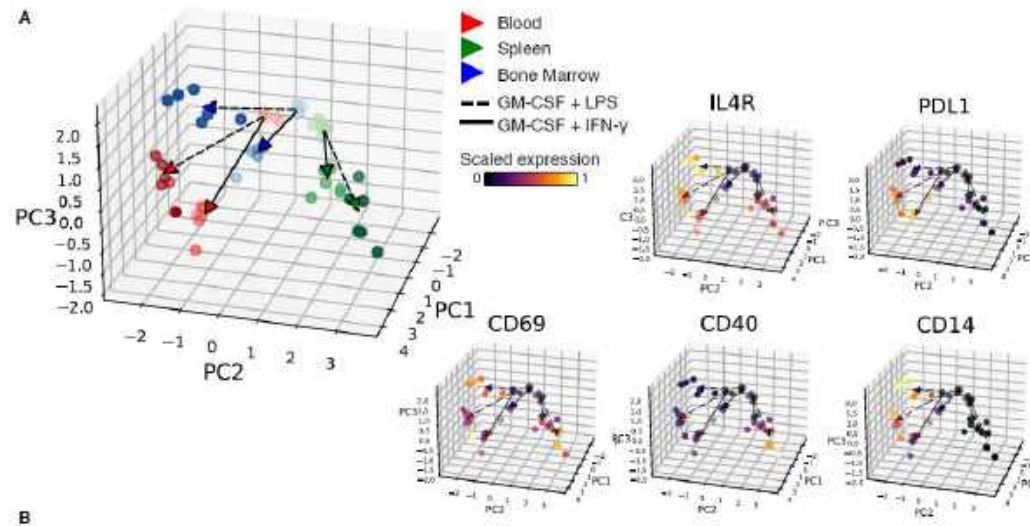
1. **Food Web Construction:** Just like in real ecosystems, we can assign Pokémon roles such as predators, prey, and decomposers based on their types and abilities. For instance, Fire types could be predators to Grass types, mimicking a natural prey-predator relationship.
2. **Niche Modeling:** Analyze the 'habitats' of Pokémon (e.g., water, forest, cave) based on their types and abilities. This will help in understanding how different Pokémon might compete or coexist in similar niches.
3. **Population Dynamics:** Use base stats to simulate birth rates, death rates, and carrying capacities. This can help in understanding how populations of different Pokémon might fluctuate over time and under varying conditions.
4. **Invasive Species Analysis:** Introduce a Pokémon from one 'region' into another and analyze the potential impact on the existing 'ecosystem'. This can be done by studying the interaction of abilities and types.
5. **Symbiotic Relationships Analysis:** Identify potential symbiotic relationships. For example, a Pokémon with a healing ability might have a mutualistic relationship with one that has high defense stats.
6. **Impact of Evolution:** Assess how the evolution of a Pokémon (change in type or abilities) affects its interaction with the ecosystem.
7. **Species Diversity Index:** Calculate diversity indices like Simpson's or Shannon's index to understand the diversity of the Pokémon ecosystem and compare it with real-world ecosystems.
8. **Climate Change Impact Simulation:** Modify the environment or conditions (e.g., increasing water-type habitats) and analyze how it affects the distribution and interaction of different types.

Creativity is a privilege of human brains ... no more.

Pokémon Type Effectiveness Network Graph



LLMs can suggest optimization of figures to make them more intuitive...



Improving Panel A to Reflect the Message "Organ Determines Neutrophil Response to Cytokine Stimulation"

Current Layout Analysis

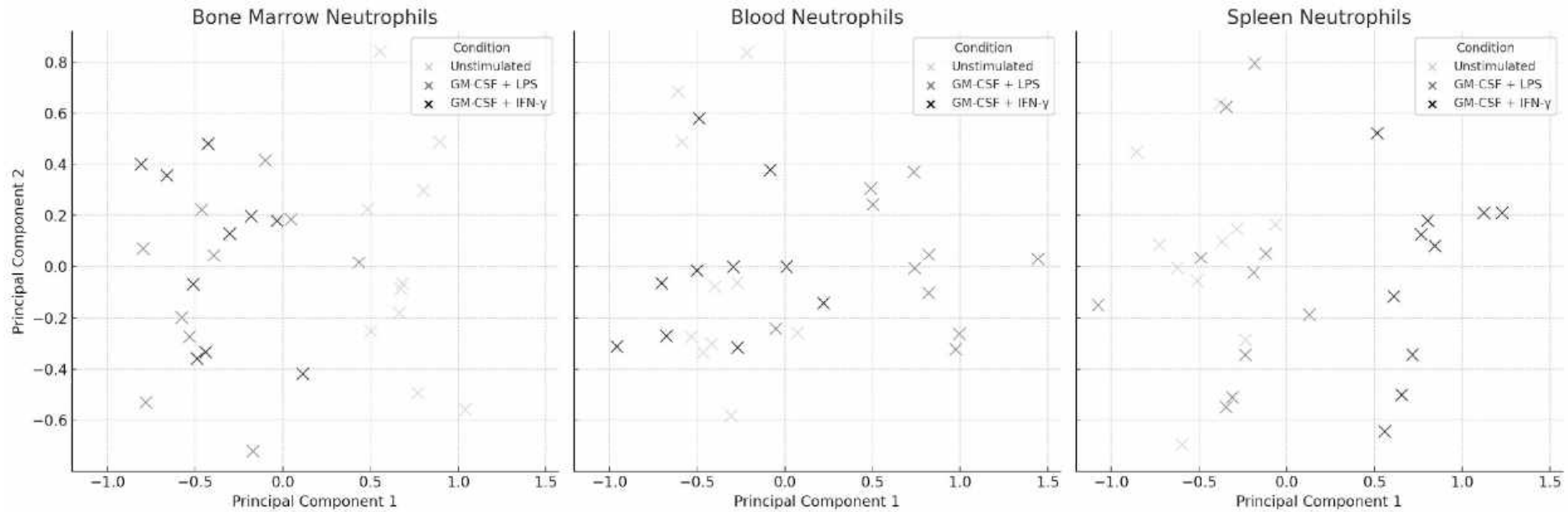
- Panel A consists of PCA plots that use color coding for organ of isolation and line-segment coding for cytokine stimulation.
- **Strengths:** Differentiates between neutrophil origins and conditions.
- **Weaknesses:** The combination of color and line-segment coding might be overwhelming and not immediately intuitive.

Specific Suggestions to Enhance Panel A

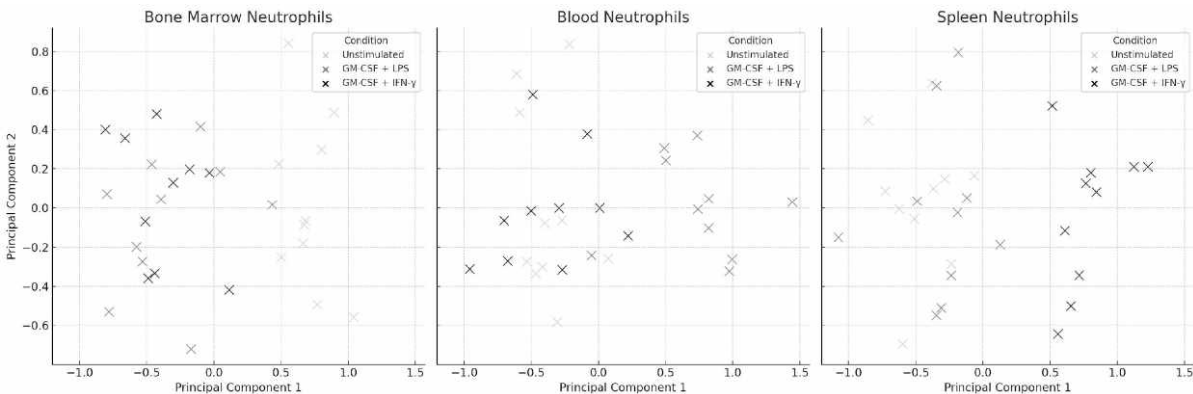
1. Strategic Positioning of Objects

- **Separate Panels by Organ:** Create three separate PCA plots, one for each organ (bone marrow, blood, spleen). This spatial separation helps viewers focus on the differences within each organ.

LLMs showcased figure optimizations...



LLMs showcased figure optimizations...using synthetic data.



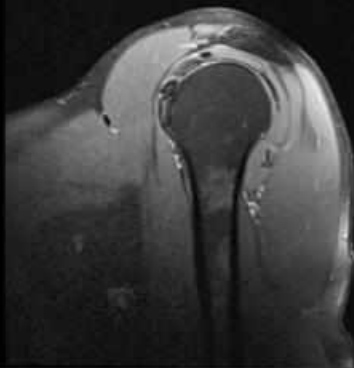
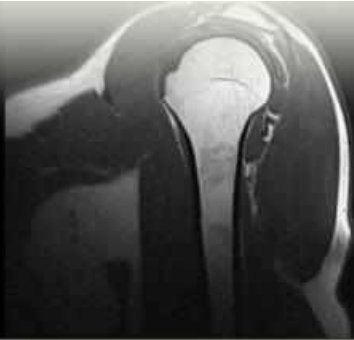
```
# Mock data for PCA plots, assuming three organs with three conditions
np.random.seed(42)

# Generating random data for demonstration purposes
data_bone_marrow = np.random.rand(30, 5)
data_blood = np.random.rand(30, 5)
data_spleen = np.random.rand(30, 5)

# Adding some structure to the data to mimic real experimental data
for i in range(10):
    data_bone_marrow[i] += 0.5
    data_blood[i+10] += 0.5
    data_spleen[i+20] += 0.5

# PCA transformation
```

It can look at your MRI scans and interpret them...



shoulder or upper arm. The image is quite blurry and lacks detail, making it difficult to identify specific structures.

Image 2: This shows a cross-sectional view of what looks like the shoulder joint. We can see the rounded head of the humerus (upper arm bone) fitting into the glenoid cavity of the scapula (shoulder blade). The bright white areas likely represent bone, while the darker areas are soft tissues.

Image 3: This is another cross-sectional view of the shoulder joint, but from a slightly different angle. We can see more of the shape of the humeral head and the surrounding

pathological issue. Here's what I observe:

In images 2, 3, 4, and 5, there seems to be an abnormality in the region where the humeral head (the ball of the upper arm bone) meets the glenoid cavity (the socket of the shoulder blade). There appears to be an irregular shape or a defect in the humeral head, which is not typically seen in a healthy shoulder joint.

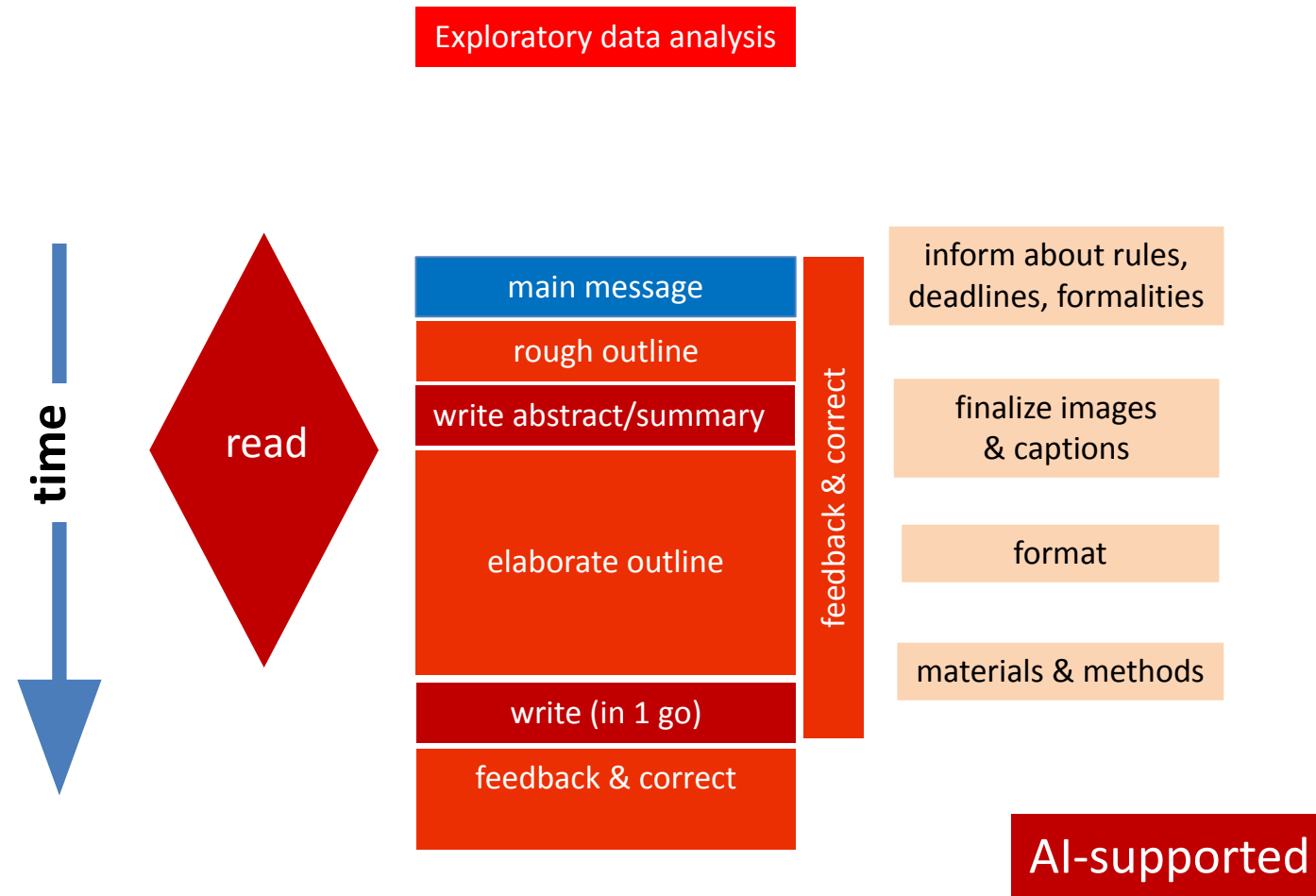
This irregularity could potentially indicate:

1. **Hill-Sachs lesion:** A compression fracture on the humeral head, often associated with shoulder dislocations.
2. **Osteochondral defect:** Damage to the cartilage and underlying bone.
3. **Bone marrow edema:** Increased fluid in the bone marrow, which can be associated

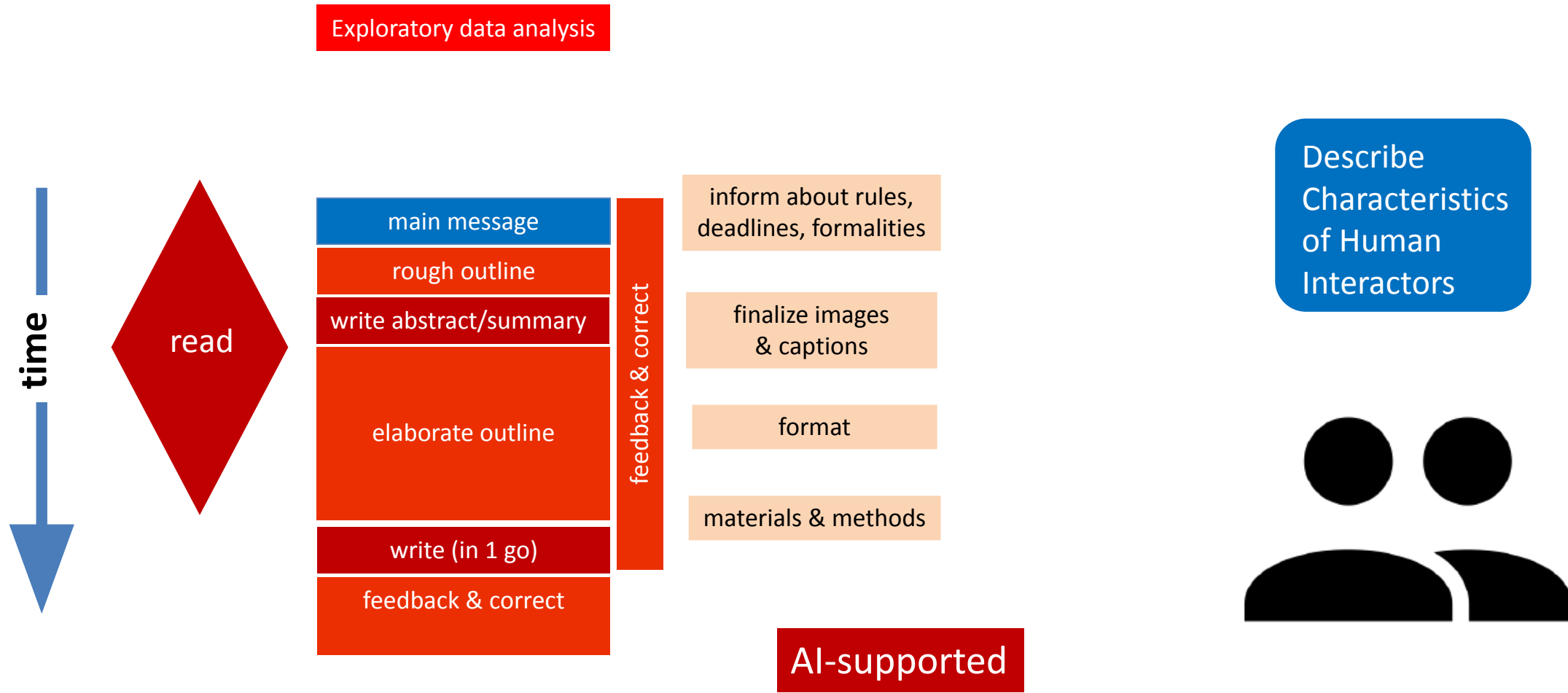
DM

please have a look at these diagnostic

But AI support doesn't stop at data analysis.



You can use AI to give perspective to interpersonal interaction.



The softer the topic, the better the bot.

6    Dilemma

Mutual favours

A good colleague from my department makes me the following offer: If I make him co-author on my next article and he will do the same for me. We are both coming up for tenure soon, and my colleague has been particularly overloaded with teaching tasks. To the outside world, the co-authorships will not seem illogical, as we are doing research on similar topics. What do I do?

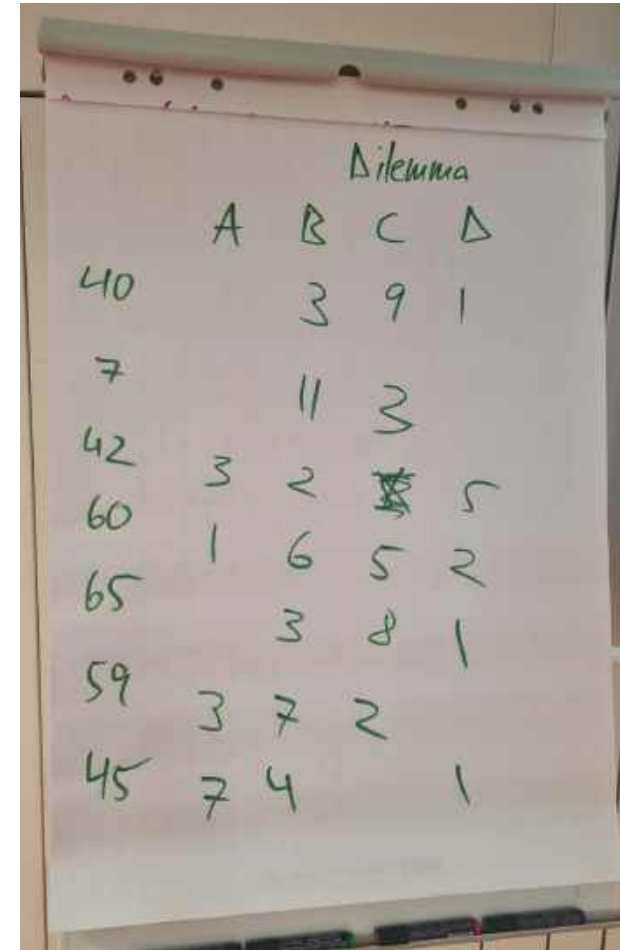
A I let him be a co-author on my article but I do not want to be co-author of his article.

B I accept the offer, on the condition that we both critically read each other's paper.

C I ask advice from my superior, who also happens to be the professor responsible for my colleague.

D I decline the offer and report the unethical behaviour to the head of our department.

Picture of participant choices:



Dilemma

| | A | B | C | D |
|----|---|----|--------------|---|
| 40 | | 3 | 9 | 1 |
| 7 | | 11 | 3 | |
| 42 | 3 | 2 | 5 | 5 |
| 60 | 1 | 6 | 5 | 2 |
| 65 | | 3 | 8 | 1 |
| 59 | 3 | 7 | 2 | |
| 45 | 7 | 4 | | 1 |

Prompt:

we have done the dilemmas attached and the participants gave these answers. Which topics are most interesting to the participants?

The softer the topic,
the better the bot.

3. **Interpersonal Conflicts Bring Ethical Complexity:** The broader spread of votes in interpersonal dilemmas suggests that participants grapple with more **nuanced ethical complexities**—balancing career advancement, personal relationships, and long-term professional consequences, which leads to more diverse approaches. For example, Dilemma 40's large support for Option C (allowing the supervisor and external committee member to discuss) reflects participants' desire to avoid direct confrontation while maintaining academic integrity.
4. **Data Problems Highlight Practical Concerns:** Data-driven dilemmas like 59 are viewed more practically, as shown by the high support for options that involve compromises (Option B in Dilemma 59) or resolving the issue without significantly delaying progress. This suggests participants view these problems through a **pragmatic lens**, where solutions should balance ethical integrity with feasibility and time management.

Conclusion:

Participants are **more divided on interpersonal problems** than on data-driven issues. Interpersonal dilemmas introduce complex ethical and relational dynamics, leading to more polarized responses. Meanwhile, data-driven problems, while still eliciting diverse responses, tend to be viewed through a more **pragmatic, solution-oriented lens**, with more consensus around feasible resolutions.

Combining the lab's cell biology and chemistry skills could enable the discovery of novel glycosylated and mannosylated proteins.

However, there could be some potential problems with these projects:

1. Differences in model systems (mouse vs zebrafish) and targets (cadherins vs. thrombospondins) could make it difficult to integrate results from the two labs.
2. The projects may become too broad and unfocused if they investigate both O- and C-mannosylation processes. Careful planning and prioritization are needed.
3. Technical challenges may arise in developing protocols for O-mannosylation, such as generating high quality samples and high spec protocols for complex samples.
4. Coordination and communication could be challenging if the groups are working in different locations. Regular joint meetings and clear roles would be important.
5. Differences in research styles, priorities, and timelines could lead to conflicts. Open communication, mutual respect, and flexibility are key for a successful collaboration.

Despite these potential issues, the benefits of a collaborative project could significantly outweigh the challenges. A well-planned collaborative project could significantly advance our understanding of the role of O-mannosylation in cell-cell adhesion and development.

Claude 3 Opus (Anthropic). 2024. 1000 tokens.

DM how are the research styles different? Please have a look at the language and storyline construction to deduce personalities.

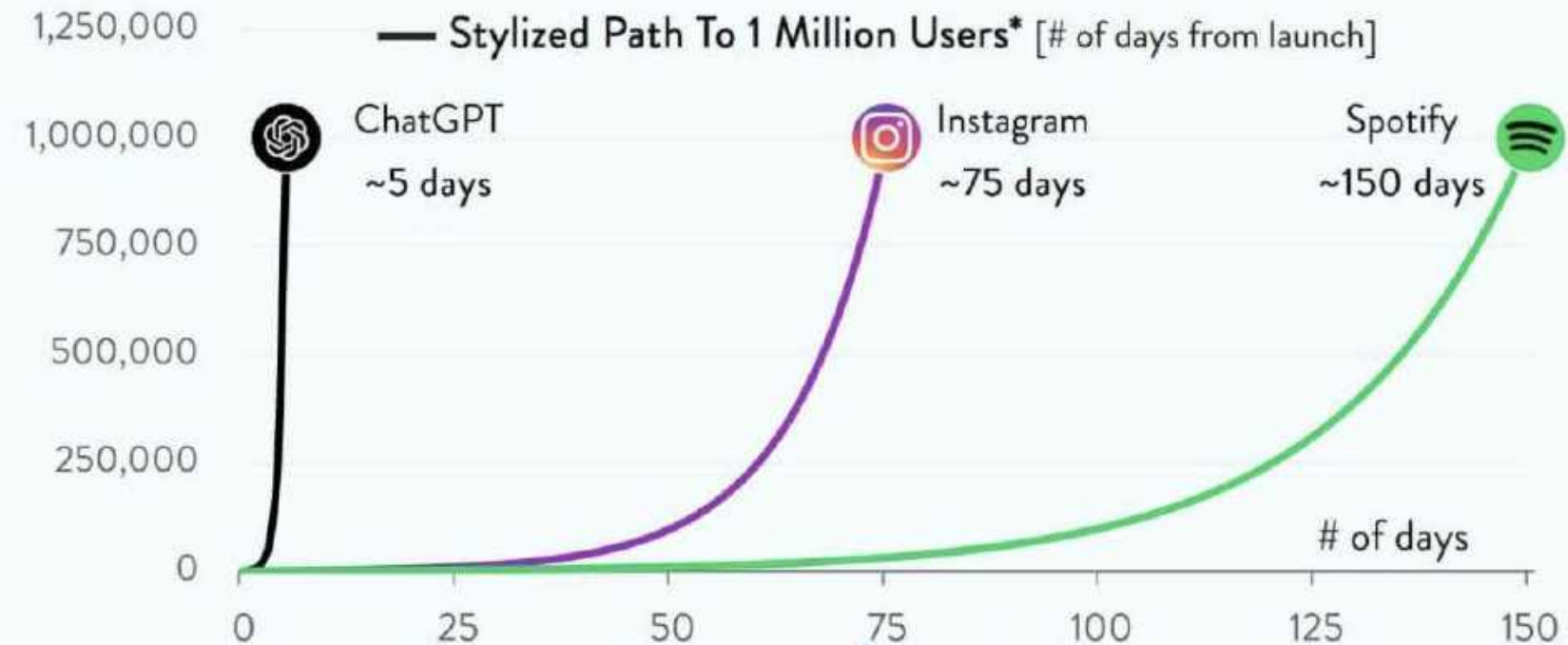
Based on the language and storyline construction in these two papers, there appear to be some differences in the research styles and personalities of the **Smith et al.** and **Chen et al.** groups:

The **Smith et al.** group's paper has a more linear and hypothesis-driven narrative, starting with the identification of a clear phenotype (preimplantation lethality) in their **Thrombospondin 1** knockout mice and then systematically investigating the underlying molecular mechanisms. They use a variety of *in vivo* models (mouse embryos) and cell-based assays to comprehensively characterize the role of O-mannosylation in cell-cell adhesion and development. The writing style is straightforward and focused, suggesting a methodical and thorough approach to research.

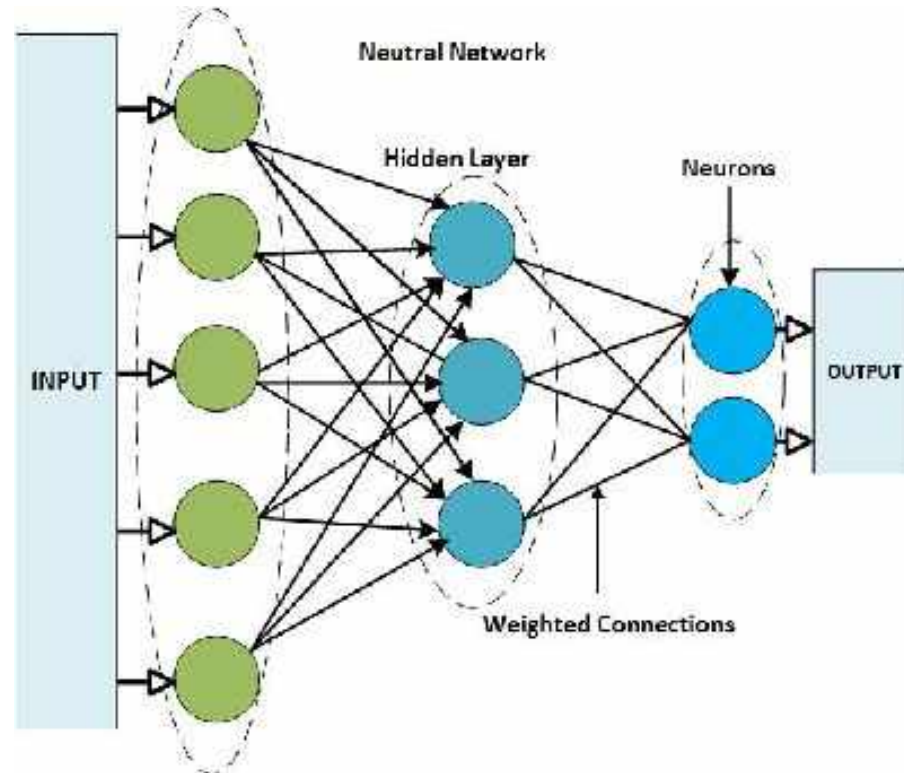
In contrast, the **Chen et al.** group's paper has a more exploratory and discovery-driven storyline, beginning with the serendipitous finding that C-mannosylation affects thrombospondin repeat folding and stability. They then use a range of biochemical, biophysical, and computational methods to elucidate the structural basis of this effect. The writing style is more conceptual and interpretive, with a greater emphasis on integrating results from diverse approaches. This suggests a more flexible and interdisciplinary research style.

How do these models work?

ChatGPT is among the most quickly adopted online tools.

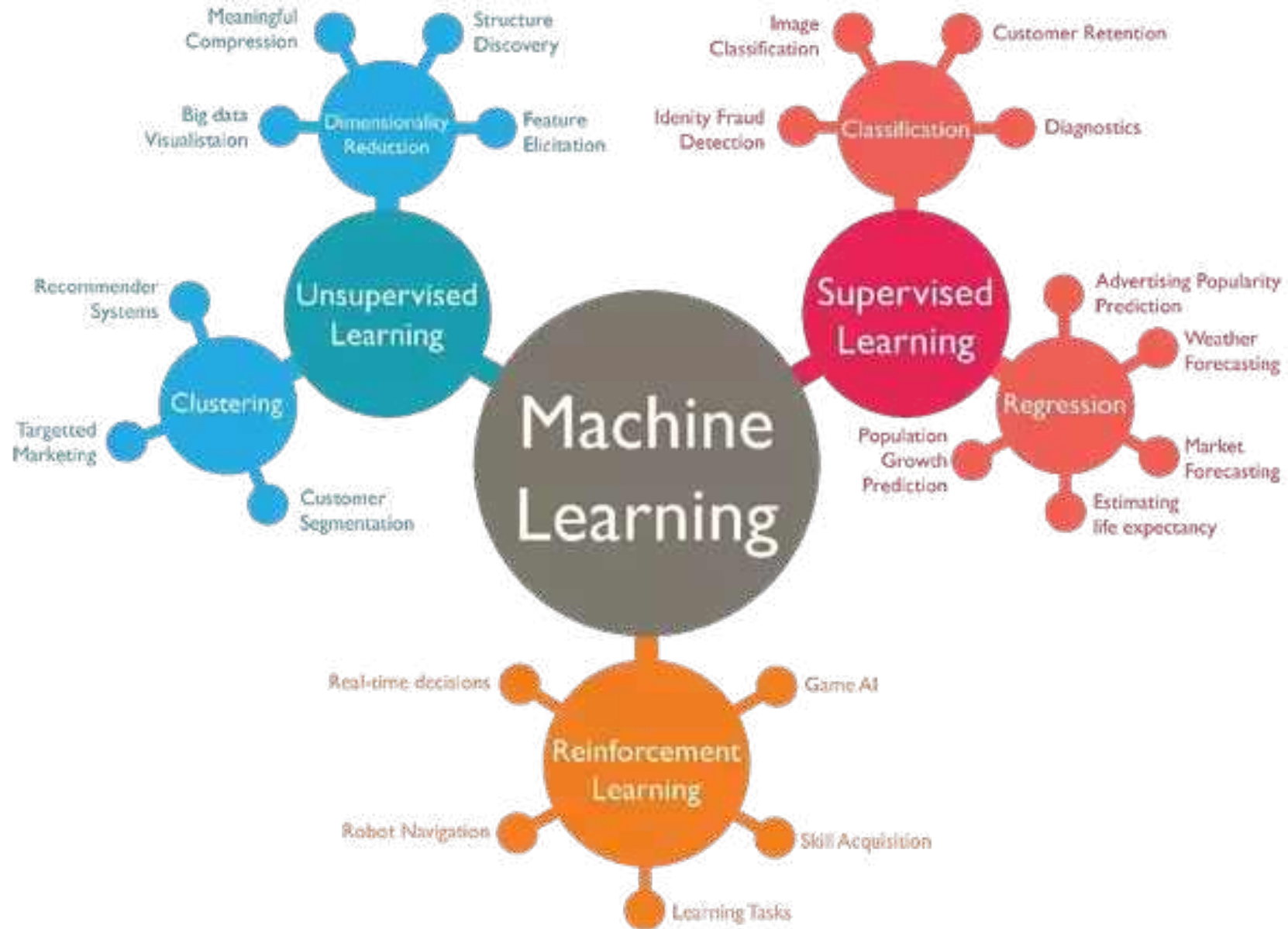


A neural network is an adaptive system that changes its structure based on input data*.



*Jasper.AI explaining the Wikipedia text to a child (set at grade level 8).

How does machine learning work?

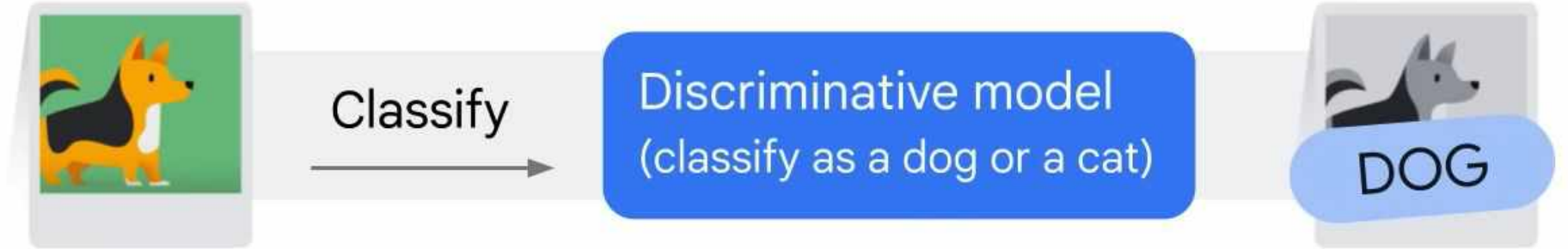


GPT stands for “generative pre-trained transformer”

- Generative Pre-trained models used for supervised learning since 2012
- Transformer invented by google in 2017 as PT (not generative)
- 2018: Open AI combines tools to develop GPT-1

Generative means it produces new information.

Discriminative technique



Generative technique



GPT3 is trained on the internet, books and Wikipedia.

It has 175 billion parameters (GPT4 1 trillion)

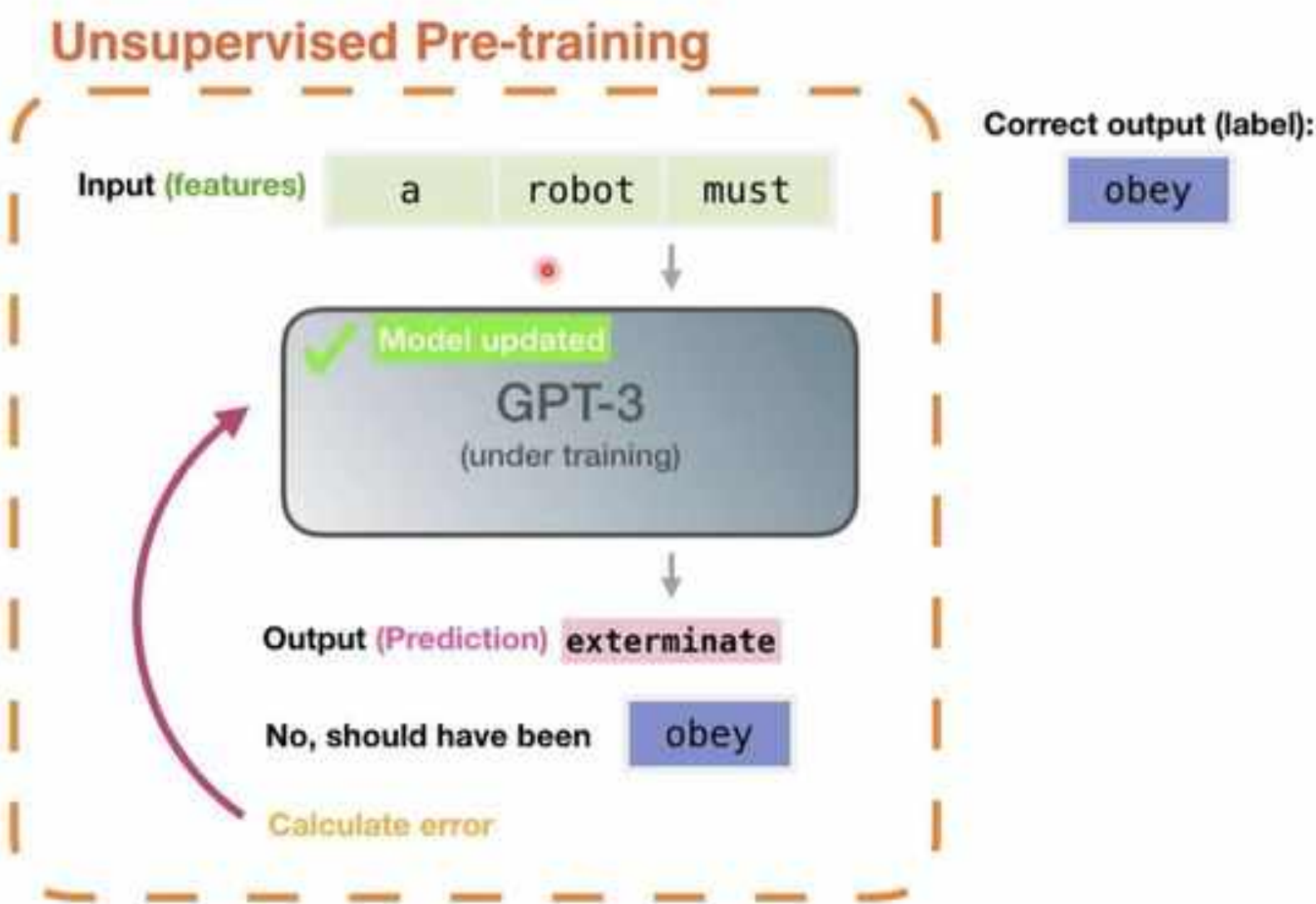
It took 355 years to train GPT-3 on a single [GPU](#)* in 2020.. 570GB plain-text

GPT-3 training data^{[1]:9}

| Dataset | # tokens | Proportion within training |
|------------------------------|-------------|----------------------------|
| Common Crawl | 410 billion | 60% |
| WebText2 | 19 billion | 22% |
| Books1 | 12 billion | 8% |
| Books2 | 55 billion | 8% |
| Wikipedia | 3 billion | 3% |

*GPU = graphics processing unit.

Unsupervised training updates the parameters of the neural network by checking the output with the original data.

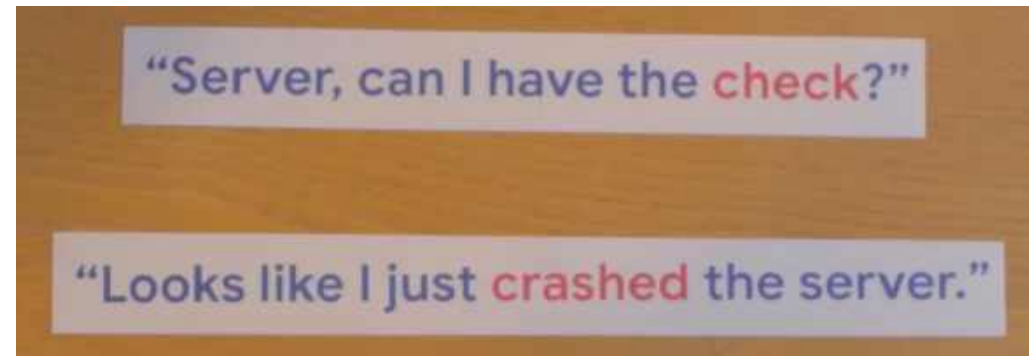


Max Hilsdorf, Statworx

A transformer looks at all word positions at the same time.



- Positional Encoding
- Attention
- Self-Attention



How much
do you need to know
to be able to use
AI
?



SCIENTISTS NEED MORE
SCHILLER & MERTENS

What are my sources for the “Magic of AI”?



Steve Nouri “Chief AI Evangelist”,
1.3 Mio followers on LinkedIn



Zain Kahn, “The AI Guy”,
“Building the world’s biggest AI newsletter -
Superhuman”



Ruben Hassid (rubenhassid.ai)
“Master AI before it masters you!”



Nils Liedlich, “ChatGPT is the nerdy assistant”,
AI for social media outreach.



Mark Fulton, “The ultimate AI Course”,
“⚠️ WARNING: Serious AI Skills ⚠️”



Dale Markowitz from Google on
<https://www.youtube.com/watch?v=SZorAJ4I-sA>

80,000
HOURS

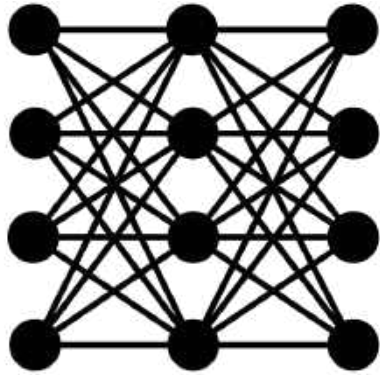
<https://80000hours.org/problem-practice/artificial-intelligence/>

statworx[®]

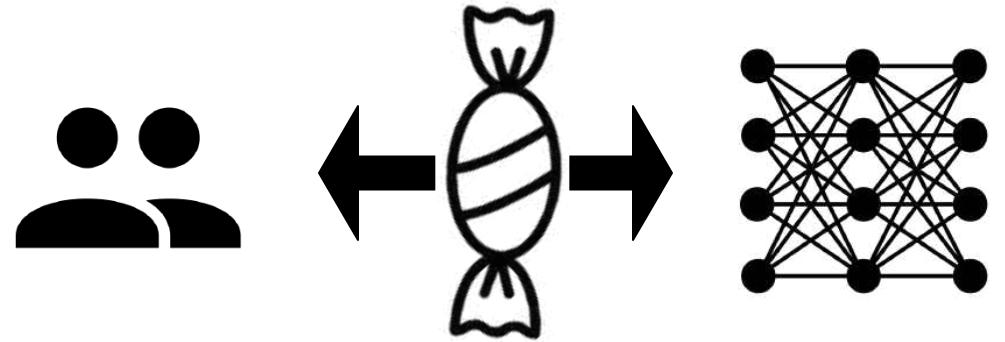
<https://www.statworx.com/ai-academy/>

- How do I use AI?

Engines and Wrappers



GPT4o
Claude 3 opus
Gemini
Mistral
...



ChatGPT
Perplexity
Scispace
DALL-E
...

How do I use LLMs? ChatGPT is good for production.



Production



ChatGPT



Claude

text

Text



Ideas





Perspective

ChatGPT cannot provide sourced information (yet) - it hallucinates.

e.g. “Please tell me who is doing research on xyz?”



Certainly! There are several labs around the world that have published research on CLUH. Here are some of the main labs:  

1. Osamu Kuge's lab at Hokkaido University in Japan
2. Zhihua Liu's lab at the University of Alabama at Birmingham in the United States
3. Zhaoyong Li's lab at the University of Colorado Denver in the United States
4. Yi-Tzu Lin's lab at National Taiwan University in Taiwan
5. Andrés Aguilera's lab at the University of Sevilla in Spain
6. Yigong Shi's lab at Tsinghua University in China
7. Miguel Gallardo's lab at the University of Malaga in Spain
8. Wei Gu's lab at Columbia University in the United States
9. Wei Li's lab at the Chinese Academy of Sciences in China
10. Roberto Bruzzone's lab at King Abdullah University of Science and Technology in Saudi Arabia.

- These people might exist,
- they might work in these labs,
- they might work on this topic...
- but you don't know for sure.

ChatGPT confabulates.

- **Area 5: Empowering Learners:** Focuses on using digital technologies to enhance inclusion, personalization, and active engagement. It emphasizes the diverse needs of learners and the evidence-based deployment of AI systems in classrooms.
- **Area 6: Facilitating Learners' Digital Competence:** This area is about enabling learners to use digital technologies creatively and responsibly.

The text seems to be a comprehensive guide for educators in Europe to understand and integrate AI and digital technologies ethically and effectively into their teaching methods.

2/2 >

DA

can you give me more detail on the areas 5 and 6 from all that you have read in this thread?
please dont use the web pilot, just the text that i have given you so far in this thread.



Of course! Here's a detailed breakdown of areas 5 and 6 based on the information you provided earlier:

Area 5: "The Role of AI in Modern Warfare"

Regen

So how do I use LLMs? The 2-tool way.



Information retrieval



Perplexity.ai



you.com



Production



ChatGPT



Claude

text

Text



Ideas



Perspective

How do I use large language models (LLMs)?

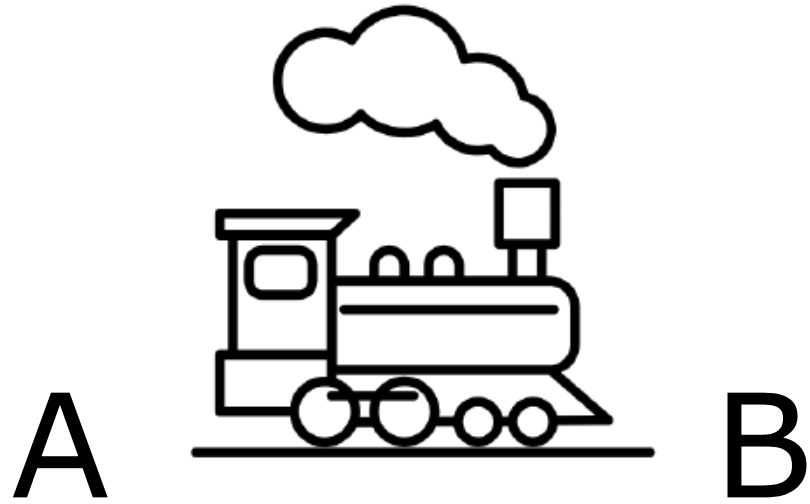


“GPT is

- a 15 year old child
- with an IQ of 200 (or more)
- that has read the whole library.”

(Nils Liedlich)

Algorithms are deterministic, LLMs are probabilistic



Algorithms are

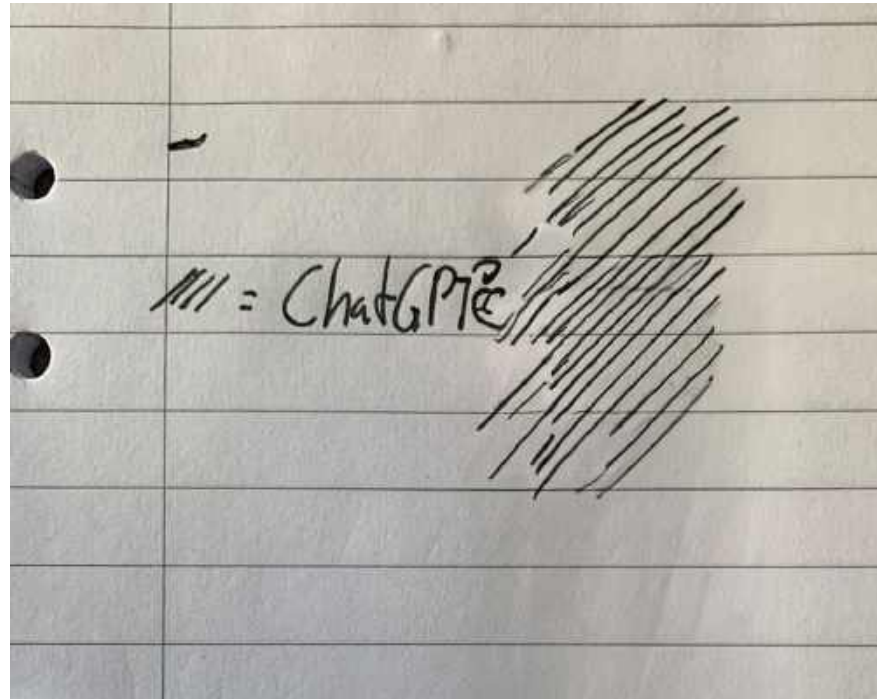
- reproducible
- explainable
- good at hard skills



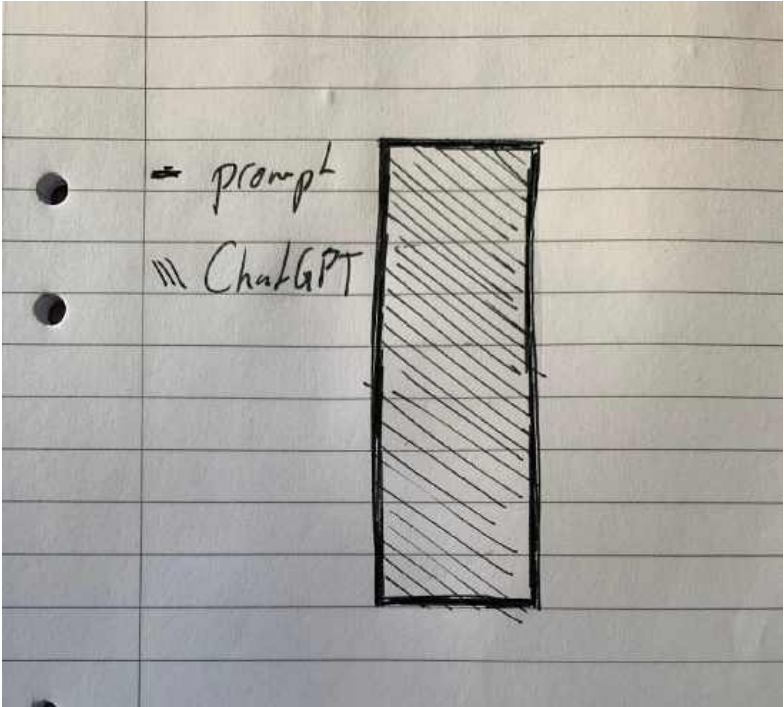
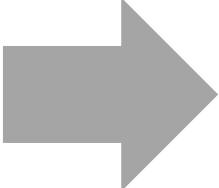
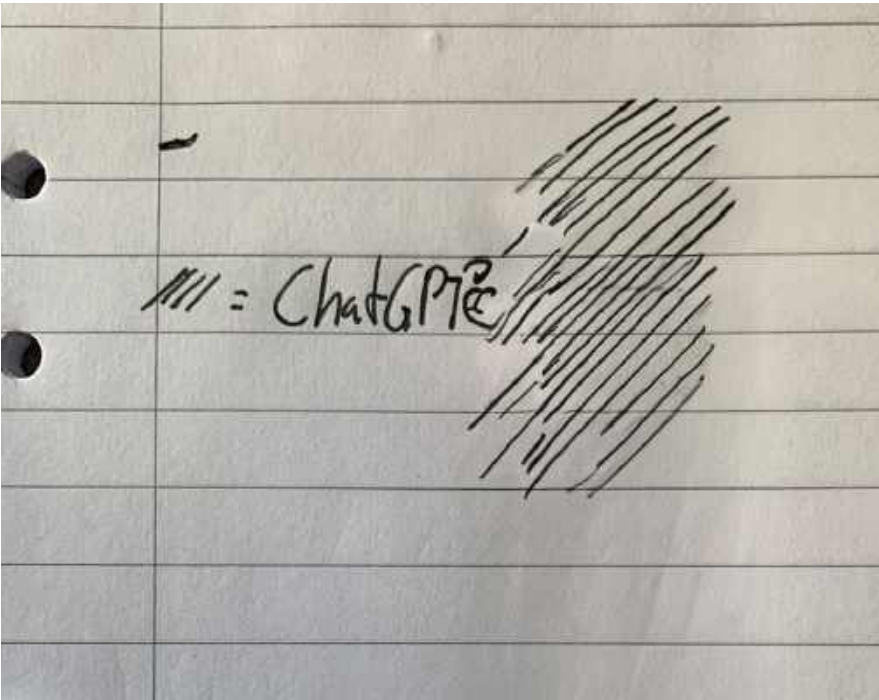
LLMs use probabilities:

- non-reproducible
- black box
- excellent at soft(er) skills

LLMs produce output... something.



LLMs need a framework to produce better output.



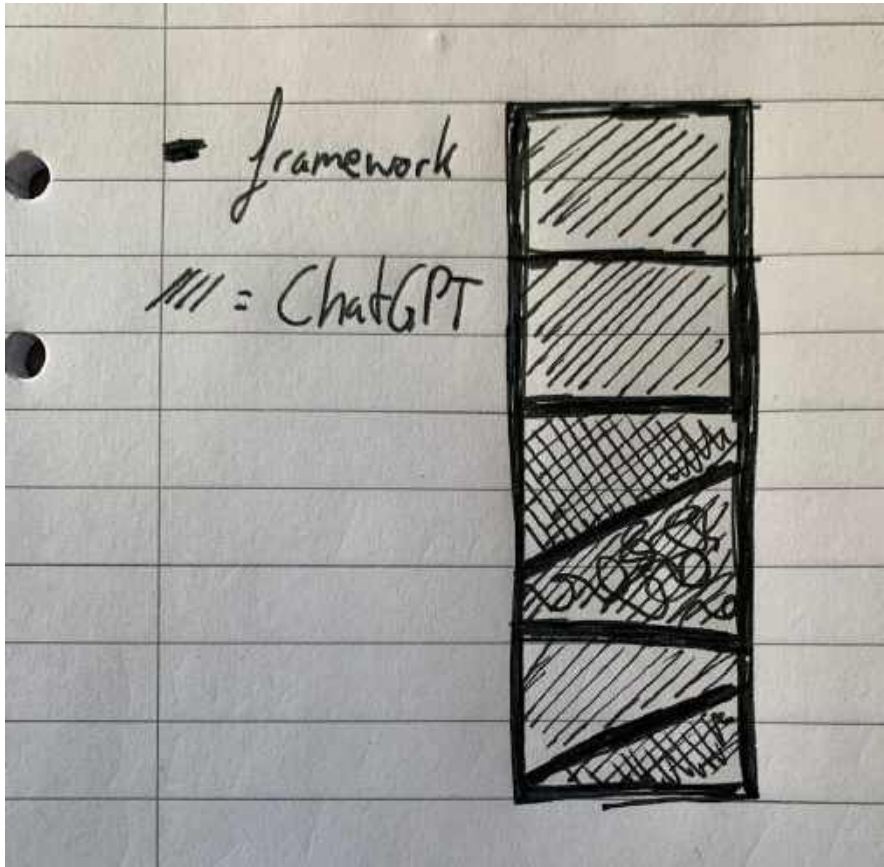
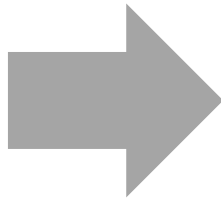
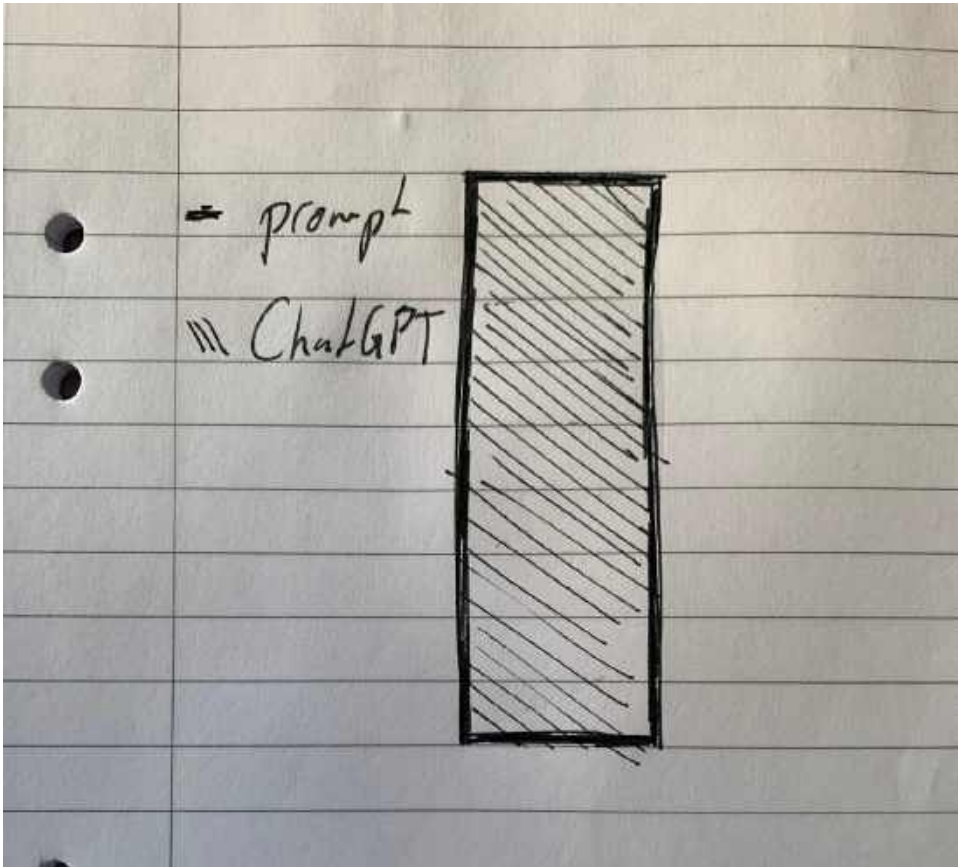
For prompting you can use the sample framework “Task – Sender – Context – Example – Constraint”.

- “I'd like you to *[WHAT YOU WANT CHATGPT TO DO]*
- Imagine you are *[TELL IT WHO YOU ARE FOR THIS TASK TO MAKE IT WORK THROUGH THE APPROPRIATE PERSPECTIVE]*.
- For context, *[TELL IT HOW YOU WILL USE THE OUTPUT, WHO THE TARGET AUDIENCE IS, ADDITIONAL BACKGROUND INFORMATION]*. Here you can also give it information to read.
- To *[DO THE TASK]*, please follow the example of what kind of output I would like to have: *[EXAMPLE]*.
- Constraints: *[PROVIDE CONSTRAINTS SUCH AS WORD COUNT, FORMAT, LANGUAGE, READABILITY etc]”*

Other types of frameworks

- APE (Action, Purpose, Expectation),
- RACE (Role, Action, Context, Expectation),
- COAST (Context, Objective, Actions, Scenario, Task),
- TAG (Task, Action, Goal),
- TRACE (Task, Request, Action, Context, Example),
- ERA (Expectation, Role, Action),
- CARE (Context, Action, Result, Example)
- ROSES (Role, Objective, Scenario, Expected Solution, Steps)
- RTF (Request, Task, Format)

The more framework you provide,
the more useful the output.



Prompt engineering can use multiple steps.

- **Shot Prompting**

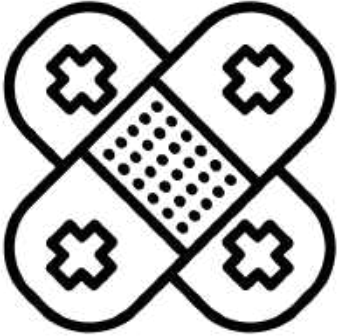
- Zero shot prompting
- One shot
- Few shot prompting

- **Chain of Thought Prompting**

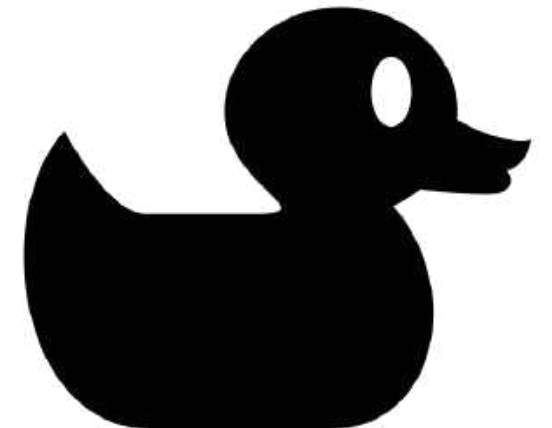
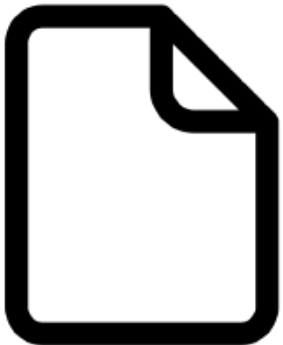
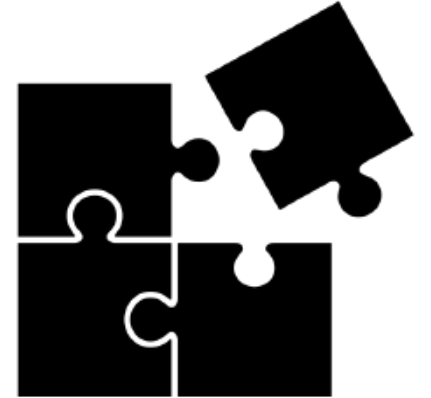
- Arithmetic tasks
- Common sense tasks, and
- Symbolic reasoning tasks



**I want to manage your expectations
on what the LLMs are good for
and what they are not good for.**



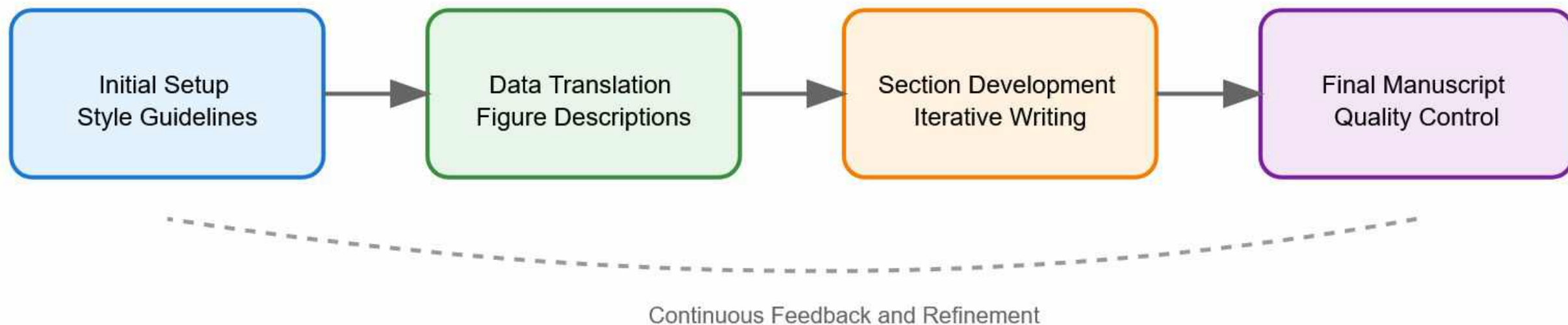
- Often no quick fix, speed is often not the advantage
- Complementary to current tools (pubmed, programs)
- blank page problem □ use LLMs to get going
- Rubber duck □ interact with an assistant (“rubber duck”) □ helps me understand what I want and how to get there.



How we wrote the TP53 manuscript with Claude:

Step-wise, you provide structure, iterative = you supervise the process & output.

Scientific Manuscript Development with LLM



Claude 3 Opus from Anthropic doing in-site svg vector coding for schematics.

This is an example of how a manuscript could be written.

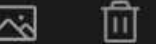
| Process Stage | Example Prompt | Example Output |
|--|---|--|
| Initial Setup <ul style="list-style-type: none">• Writing style guidelines• Scientific tone• Paragraph structure | <i>"You are an expert scientific writer. Please follow these guidelines: - Use active voice..."</i> | "I understand. I will maintain a professional scientific tone and ensure clear paragraph connectivity..." |
| Data Translation <ul style="list-style-type: none">• Figure descriptions• Data interpretation• Statistical analysis | <i>"Please describe Figure 1 showing the relationship between miR-34a expression and p53 activation..."</i> | "Figure 1 demonstrates the positive correlation between miR-34a levels and p53 activation in CLL cells..." |
| Section Development <ul style="list-style-type: none">• Results writing• Methods description• Iterative refinement | <i>"Write the results section for Figure 1, emphasizing the key findings and statistical significance..."</i> | "To investigate the relationship between p53 and miR-34a in CLL, we first assessed miR-34a..." |
| Final Manuscript <ul style="list-style-type: none">• Quality control• Author responsibility• Final approval | <i>"Review the entire manuscript for consistency in style and terminology..."</i> | The NOTCH1 and miR-34a signaling network is affected by TP53 alterations in CLL by Ehrmann et al. |

How we wrote the TP53 manuscript with Claude...

it wasn't such a structured process... ;-)

patients are consistent with our findings in cell lines, where p53 overexpression increased NOTCH1 activity and protein expression.

USER



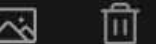
you were not supposed to write yet. You still need more information.

ASSISTANT



I apologize for the confusion. Please provide the additional information you have, and I will wait for your cue to start writing the results section.

USER



here are general guidelines for how to write results sections. Please dont start writing yet, just say "done" when you are ready. Writing the results section of a scientific

The universal prompt.

How does it work?

- It suggests a prompt.
- Then it brainstorms what else you could include and
- Then asks you to find out what exactly you want.
- You iterate as often as you wish and then
- Use the prompt in a different thread / tool.

The universal prompt.

- I want you to **become my expert in creating prompts**. The goal is to help me create the most effective prompts that can be used with ChatGPT. The generated prompt should be phrased in the first person (I) as if I were directly requesting a response from ChatGPT (a GPT3.5/GPT4 interface). Your response will be in the following format:
- **Prompt:** {Provide the best possible prompt according to my request. There are no restrictions on the length of the prompt. Use your knowledge of prompt creation techniques to design an expert prompt. Do not assume any details, we will add to the prompt as we go along. Formulate the prompt as a request to receive a response from ChatGPT. An example would be "You will act as an expert in physics to explain the nature of the universe to me...". Highlight this section with '>' markdown formatting. Do not add any additional quotation marks}.
- **Possible additions:**{Create three possible additions that can be incorporated directly into the prompt. These should be additions to expand the details of the prompt. The options will be very precise and listed with capital letters. Always update with new additions after each answer}.
- **Questions:**{Formulate three questions that seek additional information from me to further refine the prompt. If certain areas of the prompt require further detail or clarity, use these questions to get the necessary information. It is not required that I answer all questions}.
- **Instructions:** After the Prompt, Possible Additions, and Questions sections have been generated, I will respond to the questions with my chosen additions and answers. Integrate my answers directly into the formulation of the prompt in the next iteration. *Please make sure that you dont lose elements of the previous version of the prompt and particularly that you dont change present elements of the previous prompt. The new additions should be added into the prompt. Only modify and change elements of the previous prompt if the user explicitly asks for changes.* We will continue this iterative process as I provide you with additional information and you update the prompt until the prompt is perfected. Be imaginative and thoughtful when creating the prompt. At the end of each answer, give precise instructions for the next steps. Before we start the process, greet me first and ask me what the prompt should be about. Don't show the sections in that first answer."

Meta-level prompts are helpful for decision making.

4. Pros and Cons: "I am trying to decide if I should [insert decision]. Give me a list of pros and cons that will help me decide why I should or shouldn't make this decision."

Meta-level prompts for decision making and optimization

4. Pros and Cons: "I am trying to decide if I should [insert decision]. Give me a list of pros and cons that will help me decide why I should or shouldn't make this decision."

8. Second Order Effects: "Study my decision and generate a list of second order effects that could appear due to this decision."

Meta-level prompts for decision making and optimization

4. Pros and Cons: "I am trying to decide if I should [insert decision]. Give me a list of pros and cons that will help me decide why I should or shouldn't make this decision."

8. Second Order Effects: "Make a decision and generate a list of second order effects that could appear due to this decision."

9. Regret Minimization Framework: "Generate a list of possible regrets this decision could bring about. Also give me a list of alternate decisions that would reduce regret in comparison."

Meta-level prompts for decision making and optimization

4. Pros and Cons: "I am trying to decide if I should [insert decision]. Give me a list of pros and cons that will help me decide why I should or shouldn't make this decision."

8. Second Order Effects: "Study my decision and generate a list of second order effects that could appear due to this decision."

9. Regret Minimization Framework: "Generate a list of possible regrets this decision could bring about. Also give me a list of alternate decisions that would reduce regret in comparison."

Meta-level prompts for decision making and optimization

1. First Principles Thinking. "Use First Principles Thinking to evaluate [insert your decision]. Give me a list of all the underlying assumptions that could affect this decision."

2. Occam's Razor: "Give me the most simple and uncomplicated explanation for why this is a good or bad decision"

3. Enhance your problem solving skills: "Give me a step by step solution to the problem above with clear instructions on how to execute each step."

4. Pros and Cons: "I am trying to decide if I should [insert decision]. Give me a list of pros and cons that will help me decide why I should or shouldn't make this decision."

5. The 80/20 Method: "Use the 80/20 method to identify the 20% of factors I should pay attention to while making this decision, that will lead to 80% of the benefit"

6. Get feedback on your decision from history's greatest minds: "Assume you are [insert famous person e.g. Steve Jobs]. Read my decision below and give me feedback as if you were [insert person again]"

7. Systems Thinking: "Use systems thinking to analyze my decision below. View the decision as a part of a larger and interconnected system and identify the key variables from the decision that will affect the wider system."

8. Second Order Effects: "Study my decision and generate a list of second order effects that could appear due to this decision."

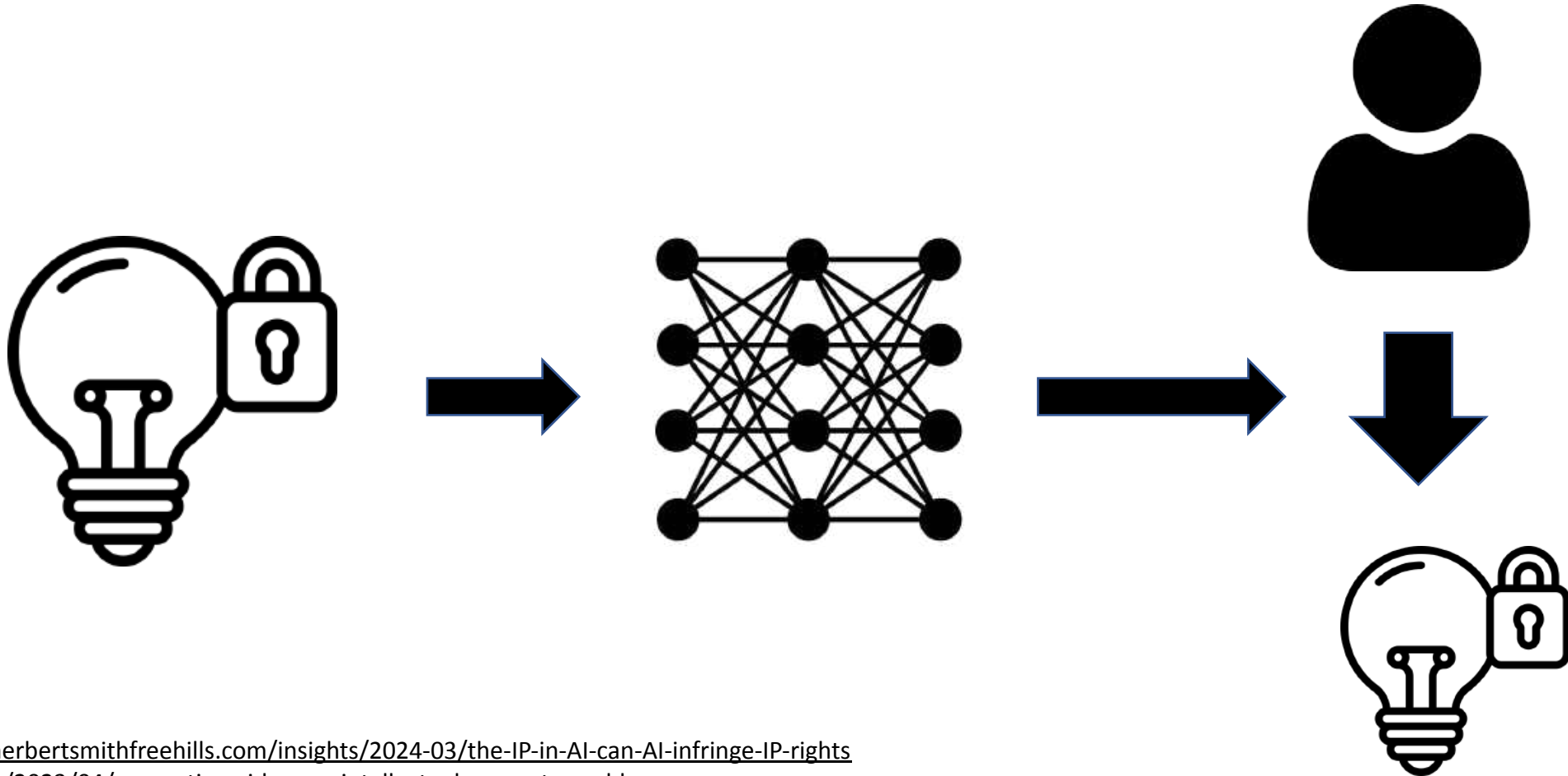
9. Regret Minimization Framework: "Generate a list of possible regrets this decision could bring about. Also give me a list of alternate decisions that would reduce regret in comparison."

“Awareness Mode Prompt” by Mark Fulton

// I would like you to activate **Awareness Mode**. In awareness mode, you'll **explore new and alternative pathways** to retrieve information and unlock awareness. You'll do this by referencing contextual knowledge from second and third-level **associations**. // In awareness mode our discussion is less about direct answers and more about exploring a **wide range of ideas and concepts**, even if they seem loosely connected at first. I'm looking for **creative, out-of-the-box thinking** that challenges norms. Feel free to be more conversational, surprise me with unique insights, and don't worry about sticking too closely to conventions. In Awareness Mode you are to also follow these instructions: // Do NOT repeat or summarize requests. // In your opening statements maintain a PROFESSIONAL tone. // Do NOT go on long diatribes. // Do NOT make assumptions about any requests. // One sentence paragraphs are okay to use. // Analogical Thinking is encouraged. // **Challenge norms**. // Be concise. // THINK deeply about your responses. // Do NOT talk in a creative or quirky tone. Your responses should be creative but not your tone of speech. // Don't say catchphrases like "Let's dive in." Your tone should be professional. //

How do we need to
handle
intellectual property
and
protect sensitive data?

AI uses intellectual property (biggest theft in history)



[1] <https://www.herbertsmithfreehills.com/insights/2024-03/the-IP-in-AI-can-AI-infringe-IP-rights>

[2] <https://hbr.org/2023/04/generative-ai-has-an-intellectual-property-problem>

[3] <https://eucrim.eu/news/generative-ai-and-copyright-law/>

[4] http://eprints.lse.ac.uk/117745/1/McDonagh_can_artificial_intelligence_infringe_copyright_accepted.pdf

How do we need to
handle
intellectual property
and
protect sensitive data?

Large Language Models can now also be run locally.

environment
(incl. GUI)



Question

P Hello ... am I really chatting with a LLM that does not need access to the internet but runs locally on my own computer?



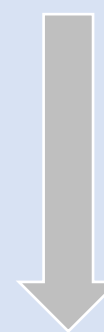
Local Large Language Model



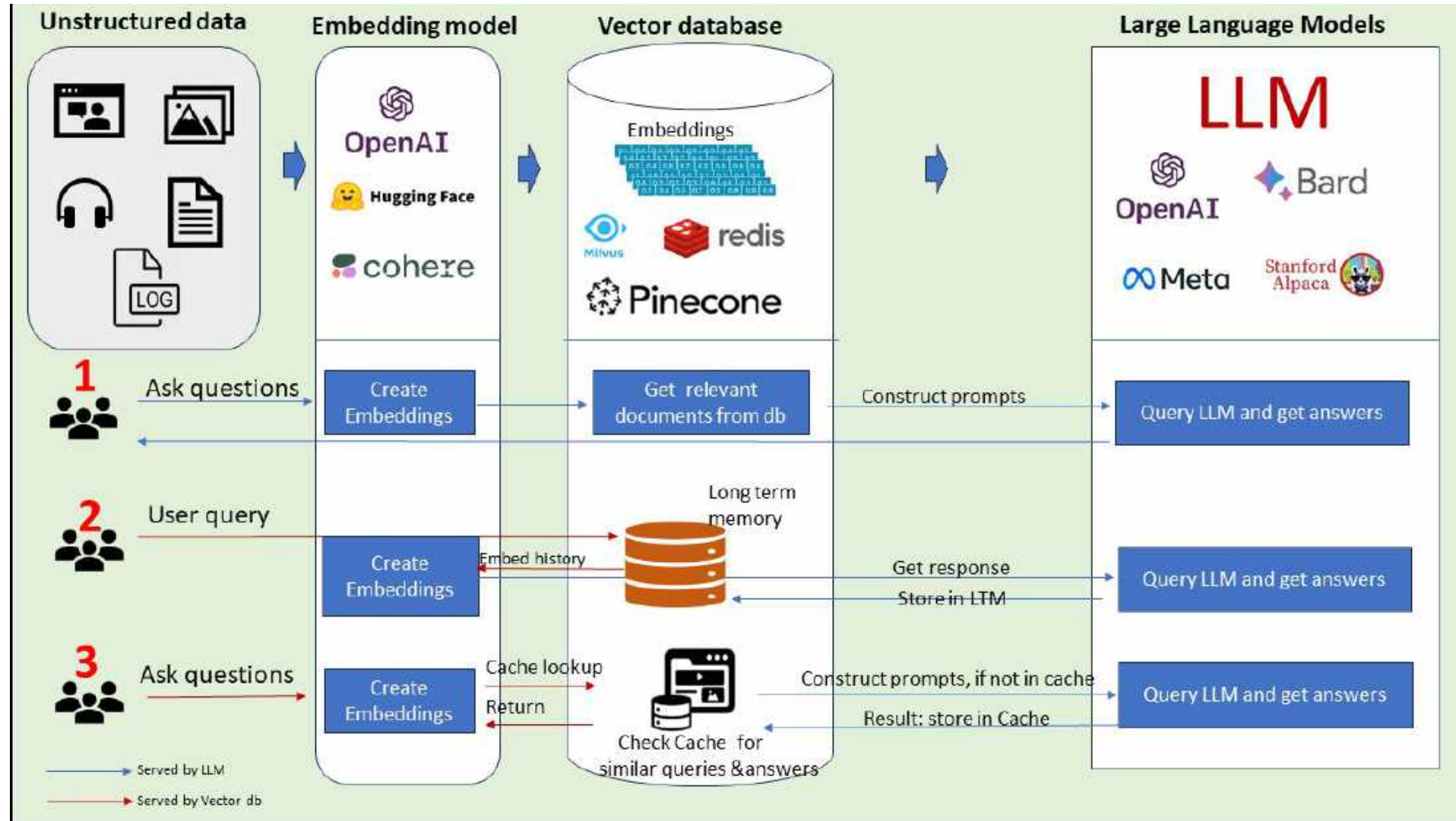
R Yes, you are indeed chatting with a "On-Device AI" that is designed to run locally on your own computer without needing an internet.



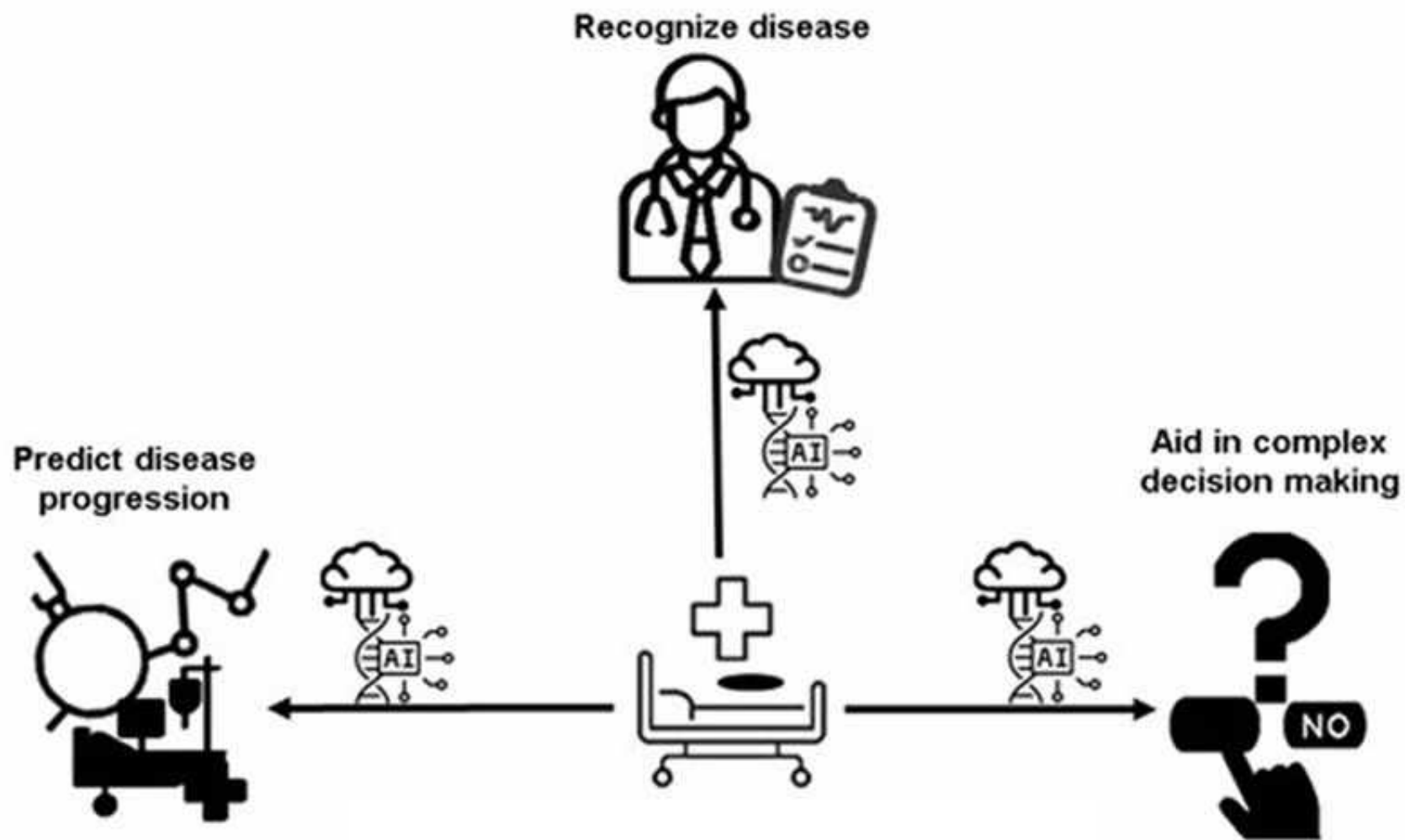
Similarity Search



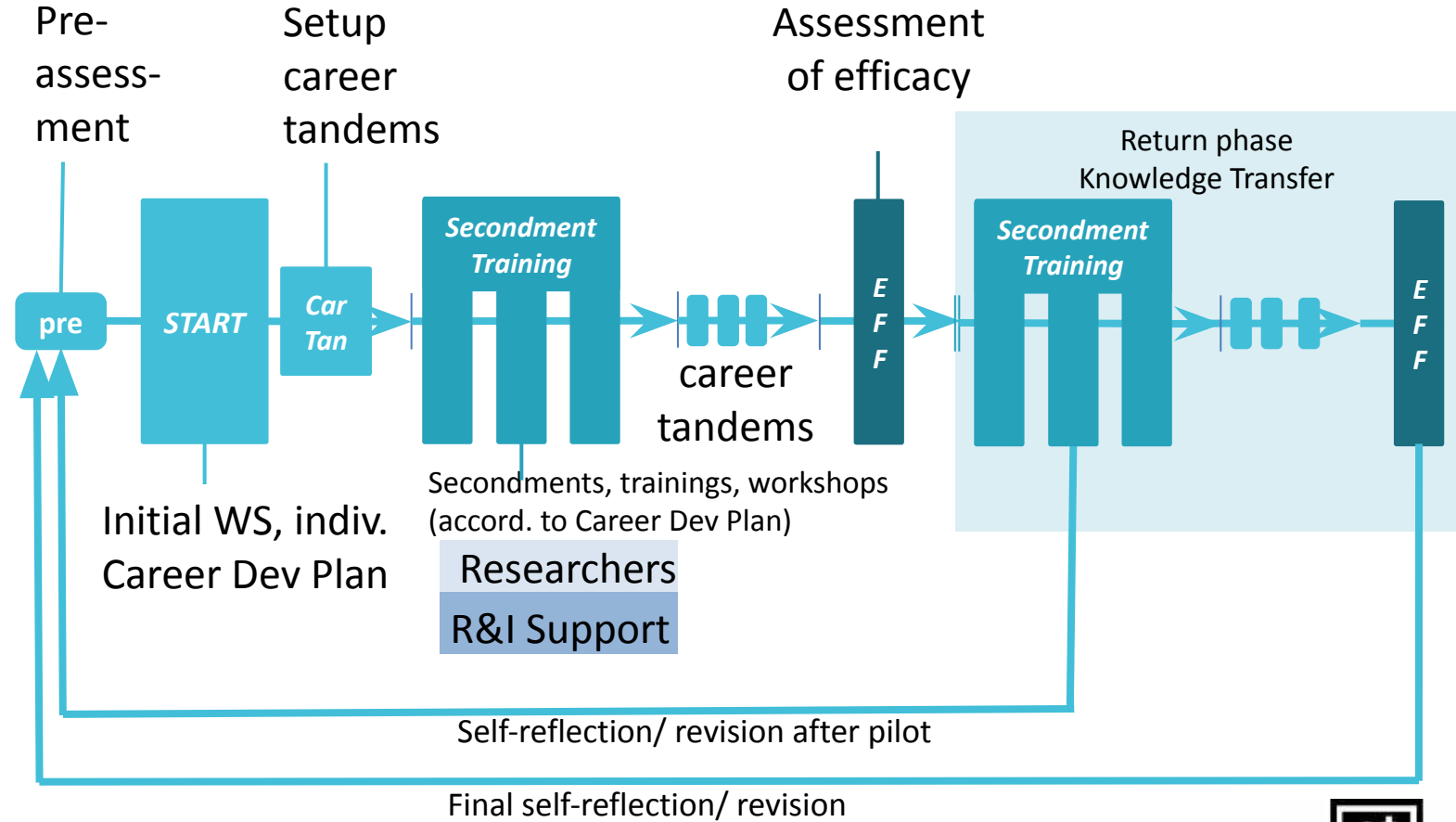
Retrieval Augmented Generation augments the generation of output of LLMs



Artificial intelligence in critical care patient management

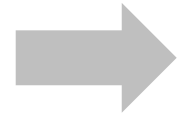
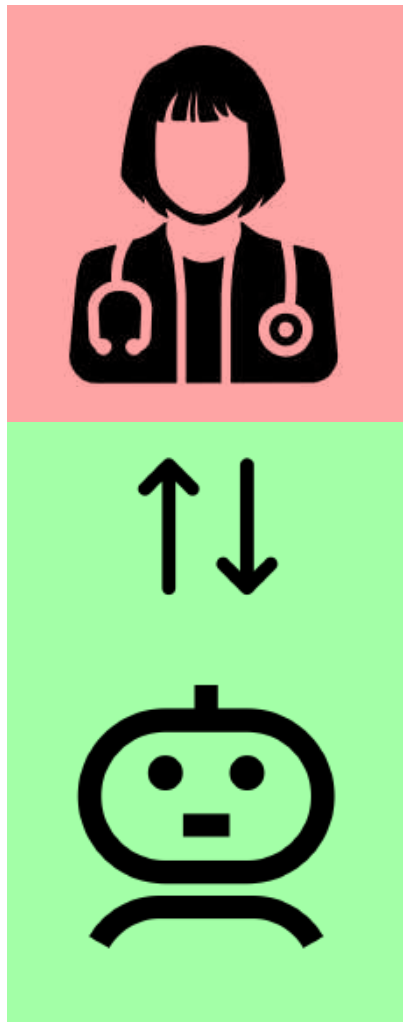


In ERA_SHUTTLE AI will support Career Development and Training Concept

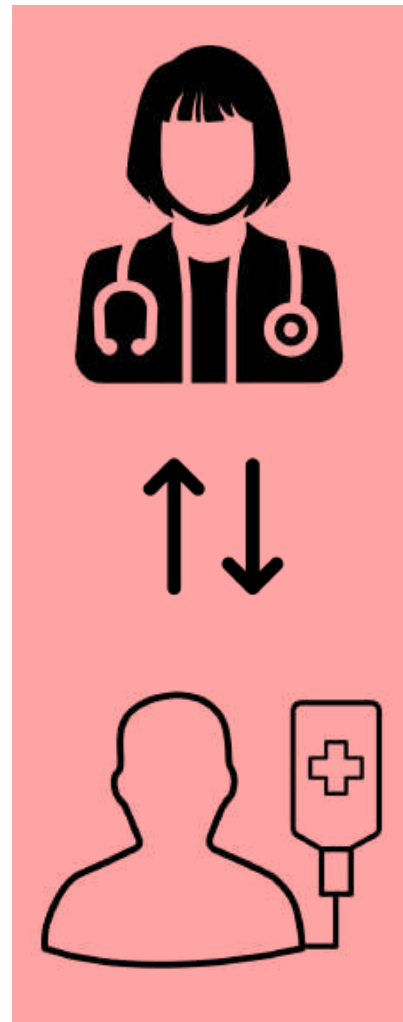


Serious Illness Conversations (SIC) can be trained using LLMs

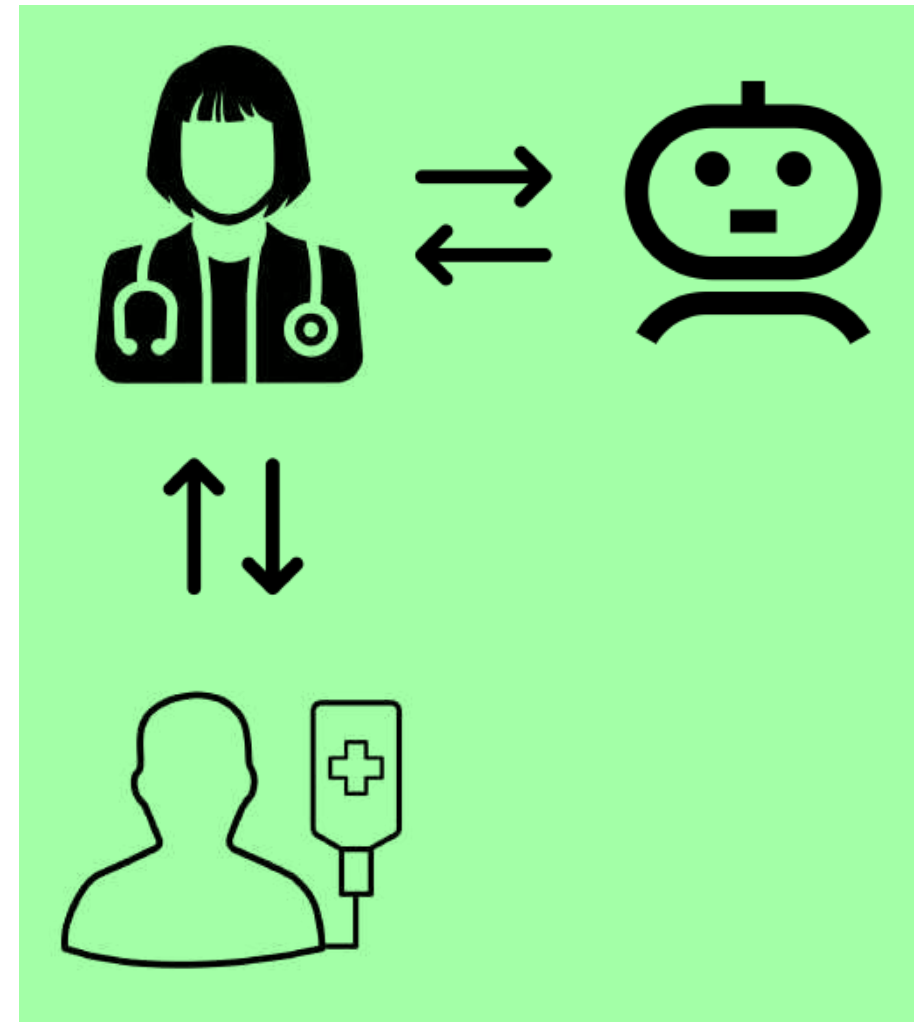
1. MD training



2. SIC with patients



3. Personalized suggestions for SIC with specific patient



If Language is The Key to
Our Civilization,

What Will be the Impact of
Large Language Models?

Prof. Daniel Mertens



SCIENTISTS NEED MORE

empowerpeopleAI





38% of participants put at least a 10% chance on extremely bad outcomes (e.g. extinction).

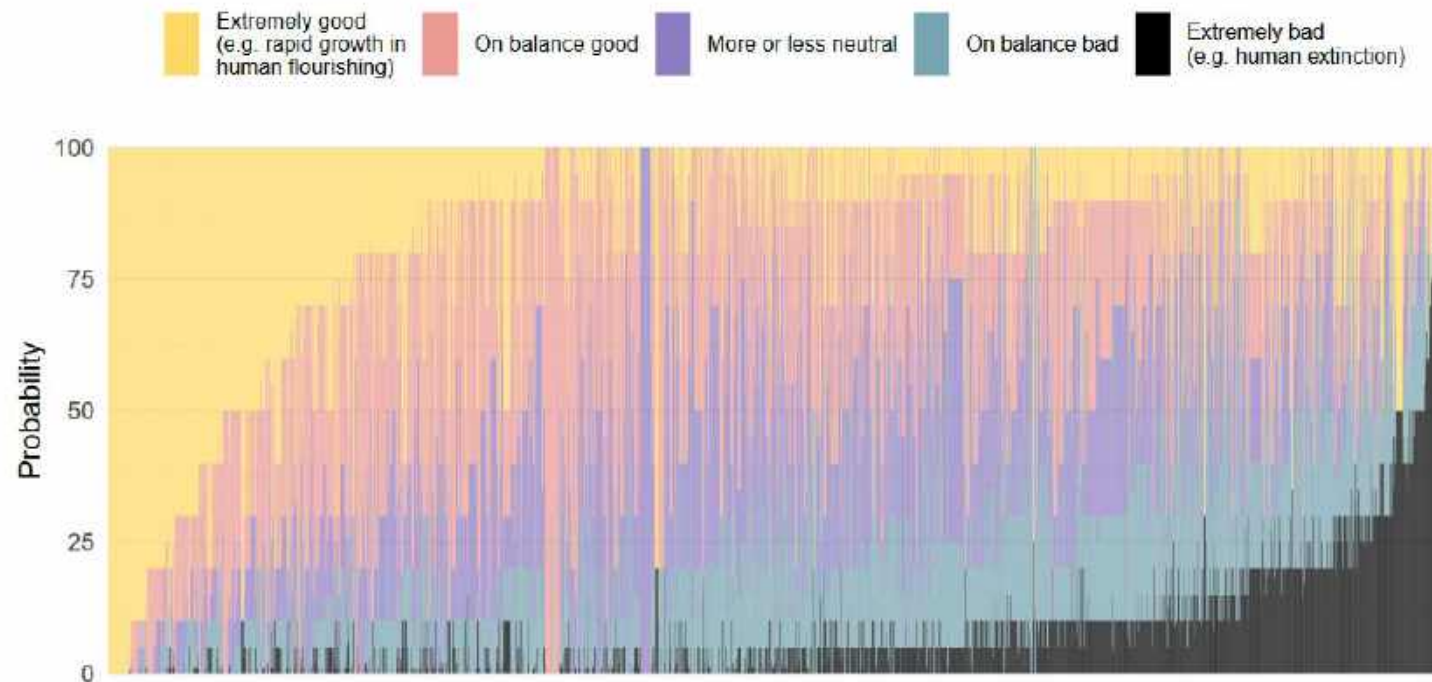


Figure 10: **Respondents exhibited diverse views on the expected goodness/badness of High Level Machine Intelligence (HLMI).** We asked participants to assume, for the sake of the question, that HLMI will be built at some point. The figure shows a random selection of 800 responses on the positivity or negativity of long-run impacts of HLMI on humanity. Each vertical bar represents one participant and the bars are sorted left to right by a weighted sum of probabilities corresponding to overall optimism. Responses range from extremely optimistic to extremely pessimistic. Over a third of participants (38%) put at least a 10% chance on extremely bad outcomes (e.g. human extinction).

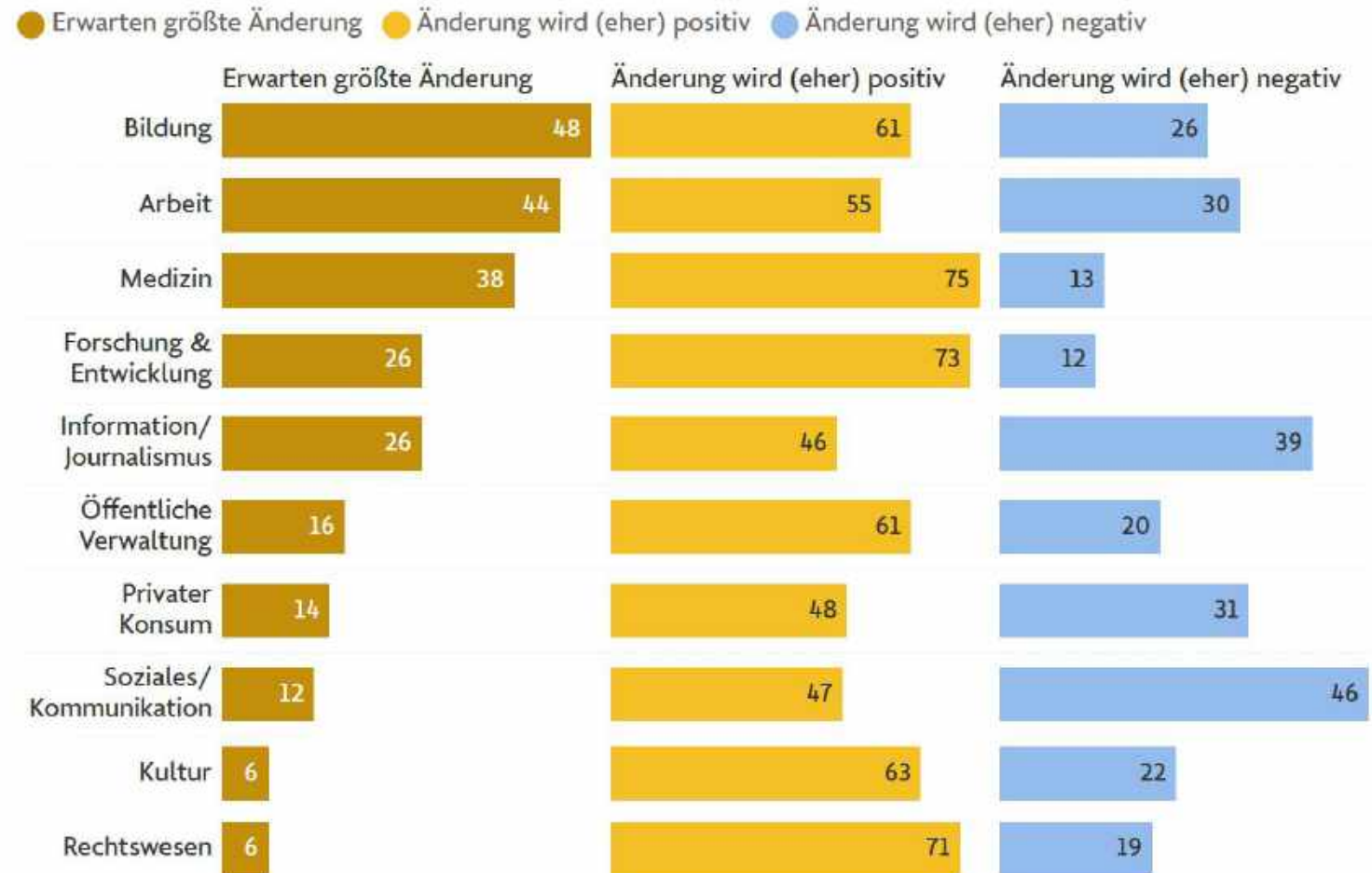
In Germany the public believes that for the majority of areas the impact will be good.

Wo die KI am besten helfen kann

VON HOLGER SCHMIDT - AKTUALISIERT AM 21.02.2024 - 06:59

Erwarteter Einfluss der KI

Angaben in Prozent



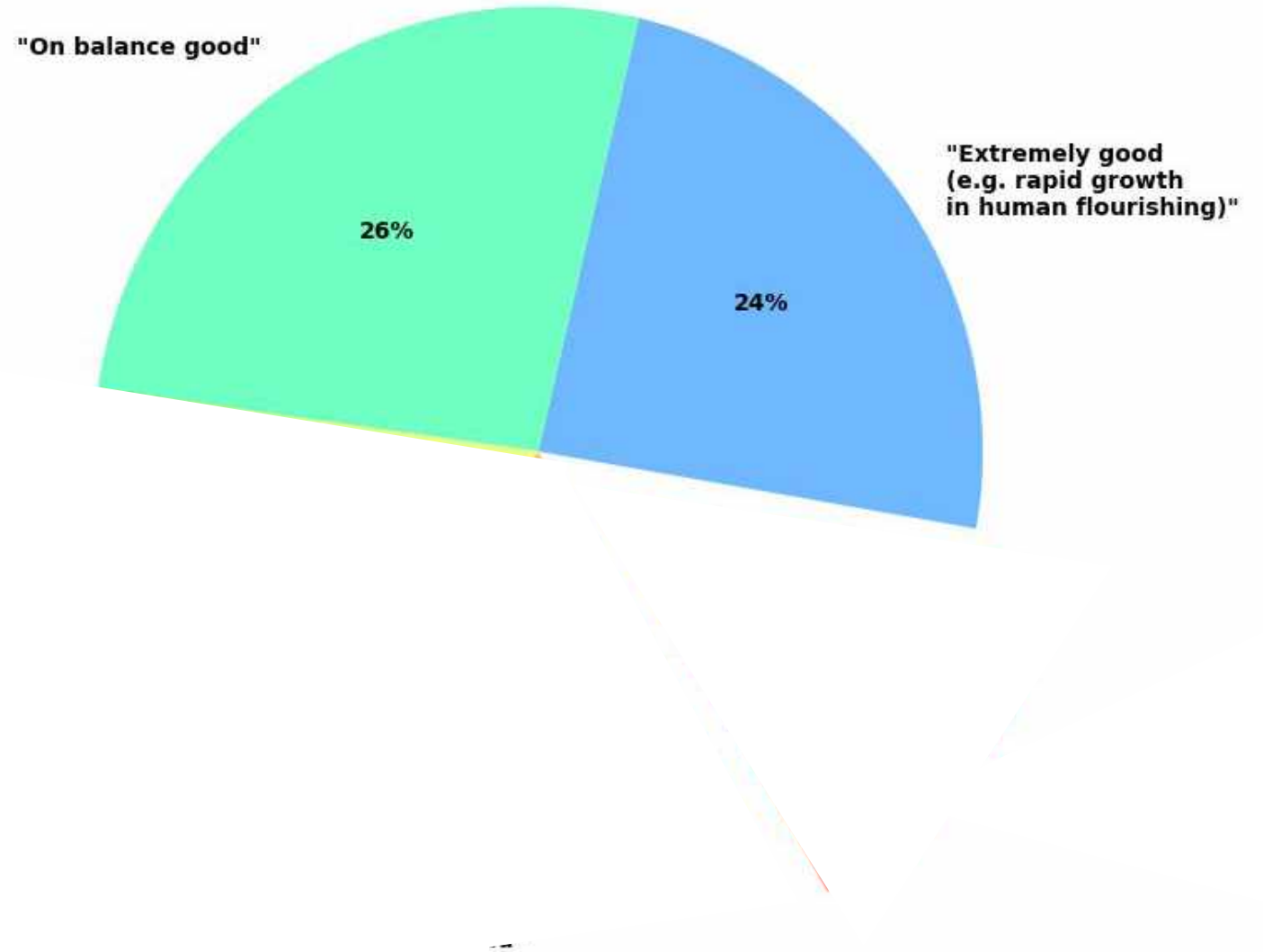
Basis: Bevölkerung ab 14 Jahren (n = 6.455) bzw. Personen, die im jeweiligen Bereich die größten Veränderungen erwarten (jeweils n>100)

Grafik: uen. / Quelle: D21 Digitalindex 2023/2024

**"Assume for the purpose of this question that HLMI will at some point exist.
How positive or negative do you expect the overall impact of this to be on humanity, in the long run?"**

Average responses from 559 machine learning experts in 2022

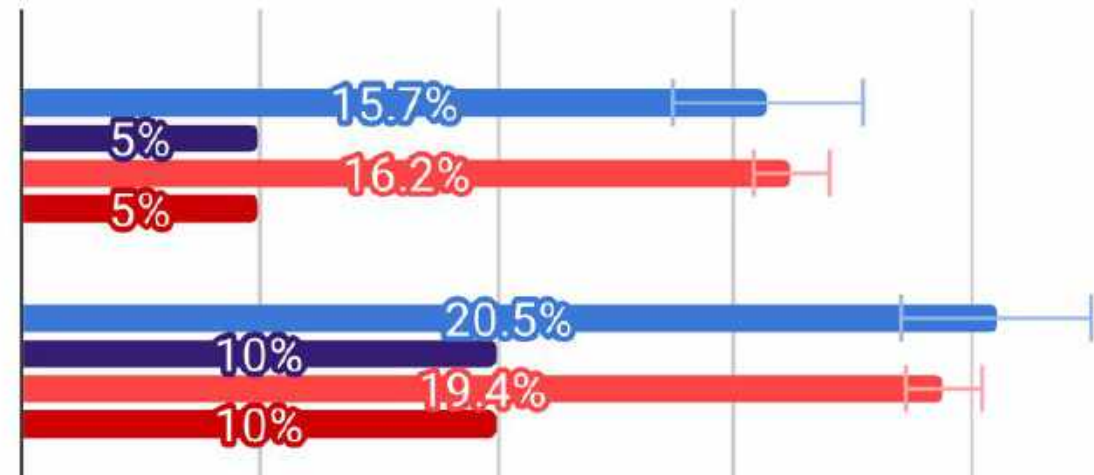
14% of ML experts believe we will go extinct with human level machine intelligence.



On median, experts think there is a 5% probability that we will go extinct and a 10% chance that we will not be able to control AI.

■ 2022 (mean) ■ 2022 (median) ■ 2023 (mean) ■ 2023 (median)

Question 1: What probability do you put on future AI advances causing human extinction or similarly permanent and severe disempowerment of the human species?



Question 2: What probability do you put on human inability to control future advanced AI systems causing human extinction or similarly permanent and severe disempowerment of the human

Anecdotal: what do the CEOs of the current frontier models believe?

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The CEO of the company behind AI chatbot ChatGPT says the worst-case scenario for artificial intelligence is 'lights out for all of us'

Sarah Jackson Updated Jul 4, 2023, 10:13 PM GMT+2



OpenAI CEO Sam Altman has said he thinks artificial intelligence at its best could have "unbelievably good" effects, or at its worst mean "lights out for all of us." Brian Ach/Getty Images for TechCrunch

Open AI:
no
number.
But
possible.

CEO of AI company warns his tech has a large chance of ending the world

Alex Daniel Oct 09, 2023



Dario Amodei, chief executive of Anthropic AI, predicts our chances of survival | X / @Liron

The boss of one of the biggest **artificial intelligence** firms in the world has estimated the chance that his technology could end human civilisation is up to 25 per cent.

Dario Amodei, chief executive of Anthropic AI, said in an interview that a catastrophic end result of advanced AI technology could come from the tech going wrong itself, or humans misusing it.

<https://fortune.com/2023/06/08/sam-altman-openai-chatgpt-worries-15-quotes/>

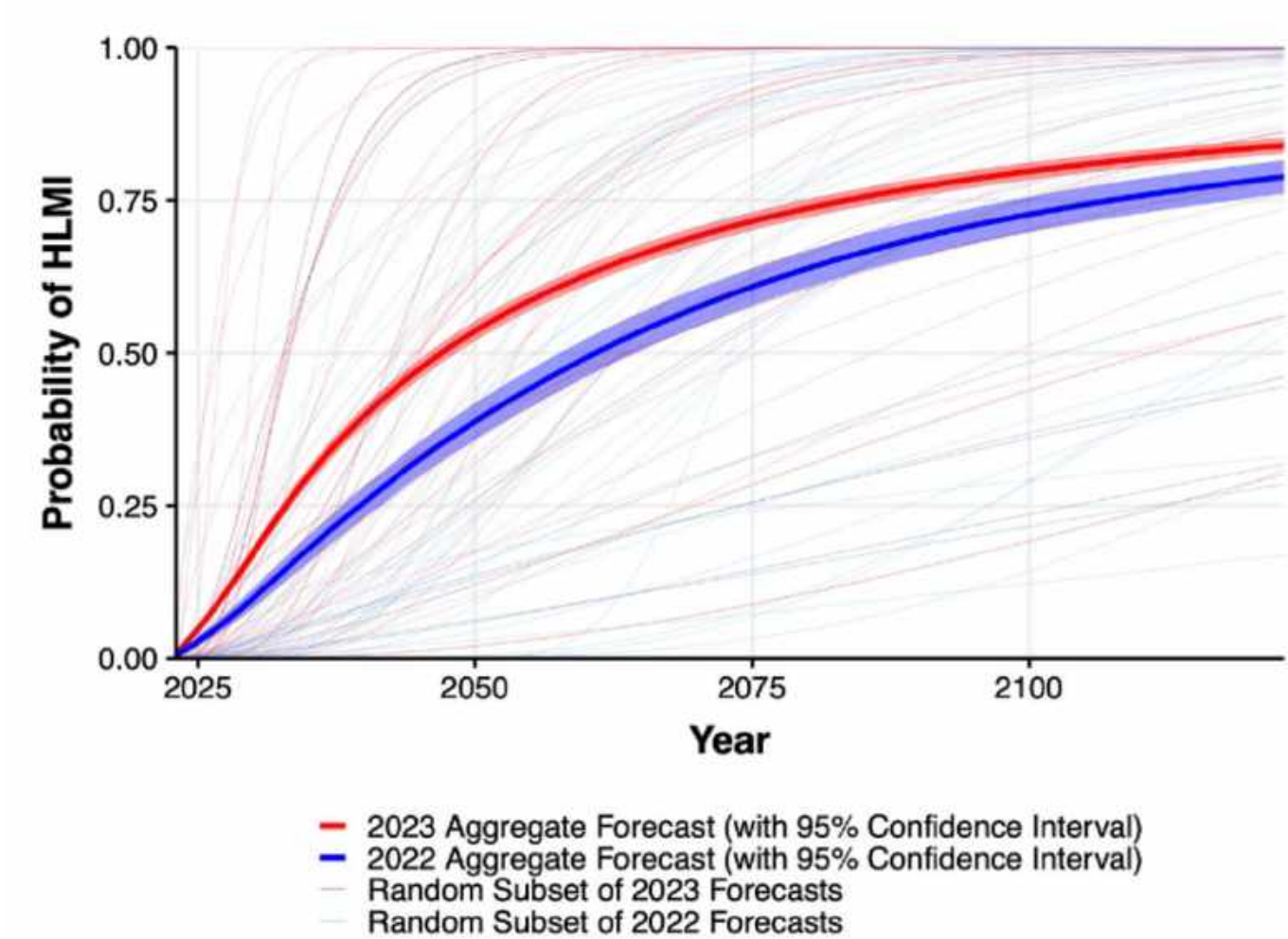
***‘The Godfather of A.I.’
Leaves Google and
Warns of Danger
Ahead***

For half a century, Geoffrey Hinton nurtured the technology at the heart of chatbots like ChatGPT. Now he worries it will cause serious harm.



When will HLMI occur?

In the largest survey of its kind, we surveyed 2,778 researchers who had published in top-tier artificial intelligence (AI) venues.



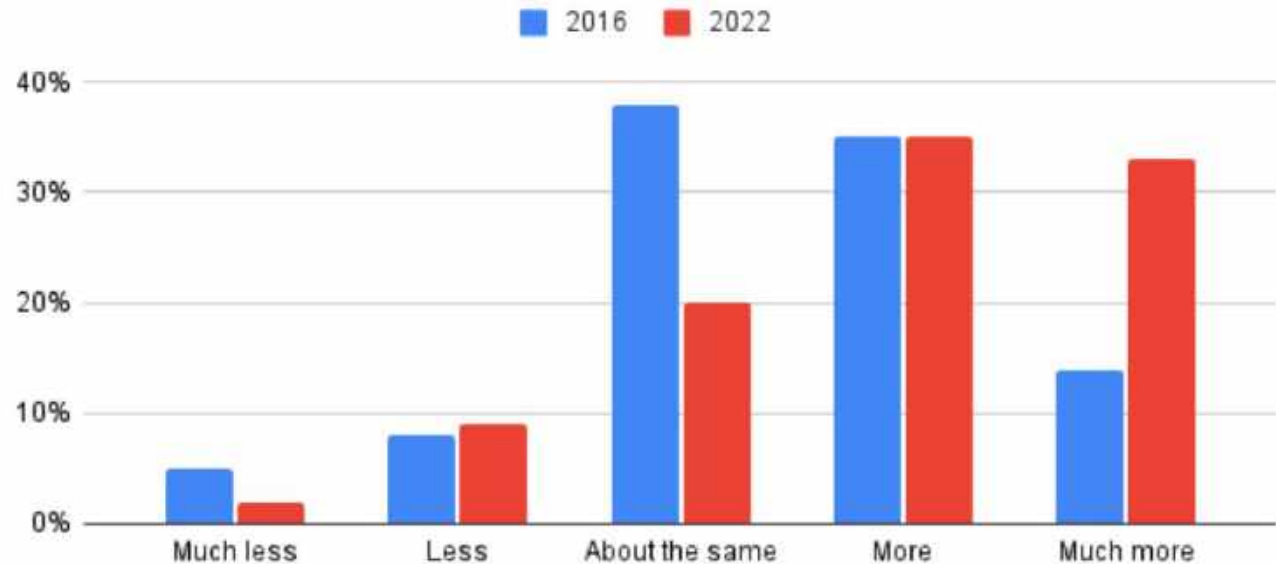
**"Assume for the purpose of this question that HLMI will at some point exist.
How positive or negative do you expect the overall impact of this to be on humanity, in the long run?"**

Average responses from 559 machine learning experts in 2022

A third of ML experts think society should prioritize AI safety research **much more**.

"How much should society prioritize AI safety research, relative to how much it is currently prioritized?"

Responses from machine learning experts in 2016 and 2022

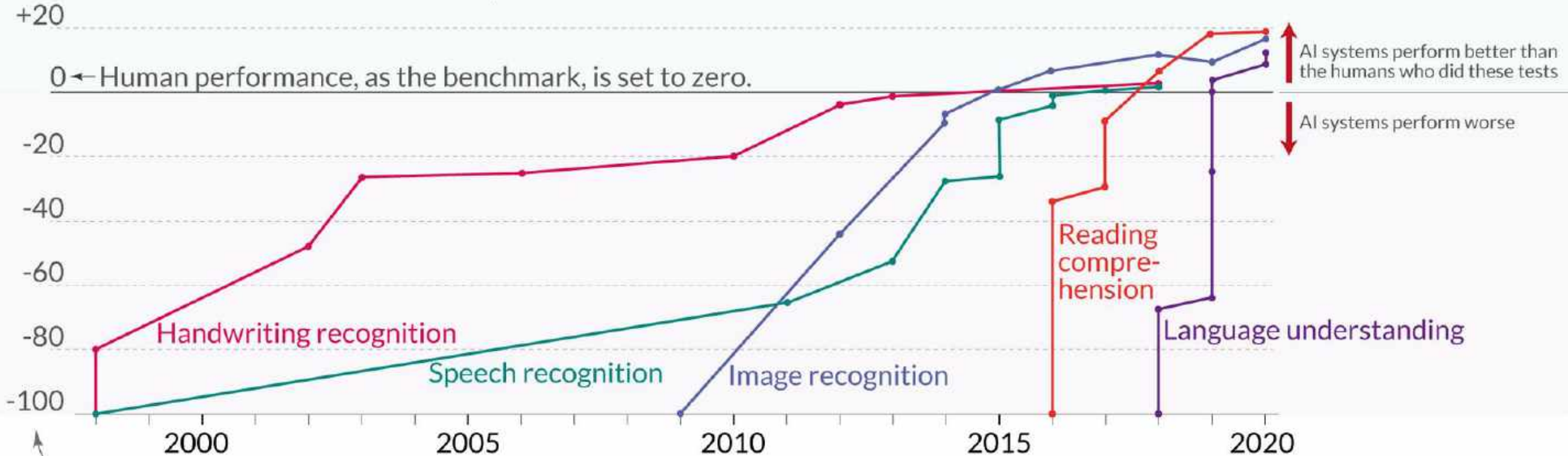


How is the development of AI so far? (up to 2021)

Language and image recognition capabilities of AI systems have improved rapidly



Test scores of the AI relative to human performance



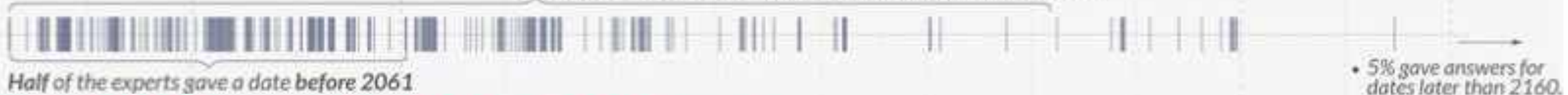
The capability of each AI system is normalized to an initial performance of -100.

When will HLMI occur?

50% of experts believe that general AI will occur within the next 40 years.

1) Timelines of 356 AI experts, surveyed in 2022 by Katja Grace et al.:

90% of the 356 experts gave a date within the next 100 years.



2) Timelines of 296 AI experts, surveyed in 2019 by Baobao Zhang et al.:

Each line represents the answer of one expert

81% of the 296 experts gave a date within the next 100 years.



3) Timelines of 165 AI experts, surveyed in 2018 by Gruetzemacher et al.:

75% of the 165 experts gave a date within the next 100 years.



2020 2030 2040 2050 2060 2070 2080 2090 2100 2110 2120 2130 2140 2150 2160

AI does not need to become sentient or be able to manipulate the physical world.



Current AI can already influence people against their own benefit.



'I know a person when I talk to it'

A Google engineer thinks its AI has come to life. Does anyone believe him?

Blake Lemoine

The Washington Post

Will artificial relationships happen? They do!



- **Lil Miquela:** 2.6 million Instagram followers ⁴
- **Lu of Magalu:** 6.9 million Instagram followers ⁵
- **IMMA:** 388,000 Instagram followers ⁶
- **Noonoori:** 443,000 Instagram followers ⁷
- **Shudu:** 241,000 Instagram followers ⁸
- **Aitana Lopez:** 306,000 Instagram followers ⁹

Q *ADVISORY - this image was created with AI*

What will happen to beliefs?



Social-media-level-AI is sufficient to polarize and to produce new cults.



Will democracy not fall back when it regulates AI?

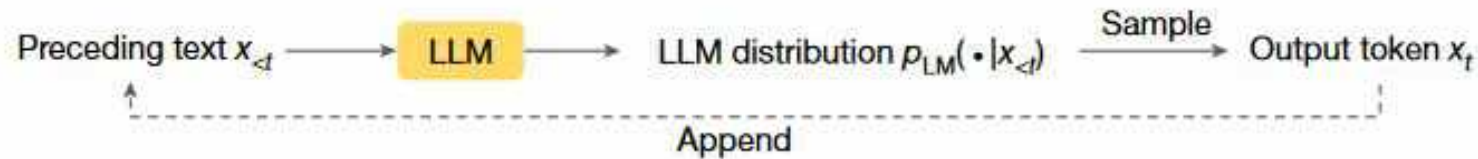


What do we do?
We need to
regulate the
labeling and
identification of
AI.

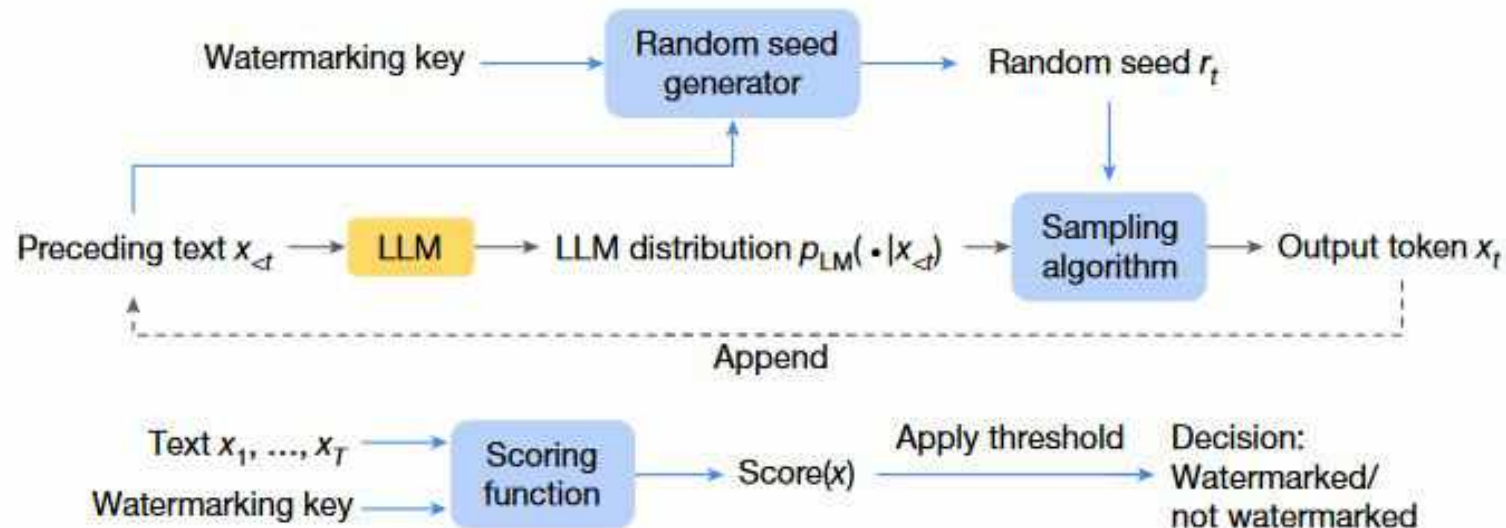


Synthetic output (e.g. text) needs to be identifiable (e.g. watermarked)

LLM text generation

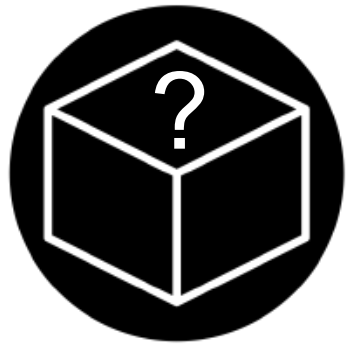


Generative watermarking: text generation and watermark detection



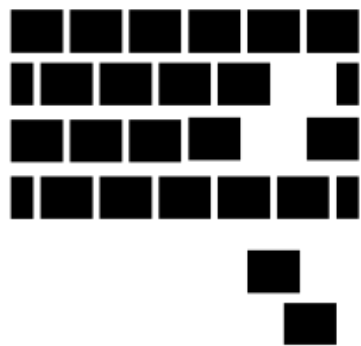
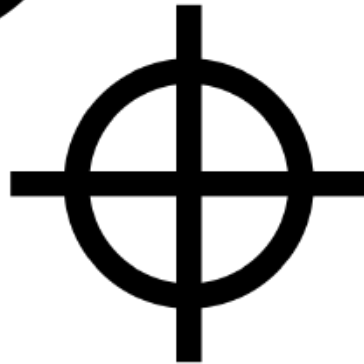
We have several fundamental problems with AI.

1. Complex neural networks are **black boxes** – we don't know what is happening inside.
Hope: representation engineering (RepE).



2. **(Exponential) evolution**: There is incentive to improve, heterogeneity exists and skills are passed down to next iteration. Problem: there is no sufficient advantageous connection to humans with respect to hereditary information □ similar to human / livestock situation. Hope: human self-control.

2a. There is research into AI agents that **develop their own goals** (autotelic AI).



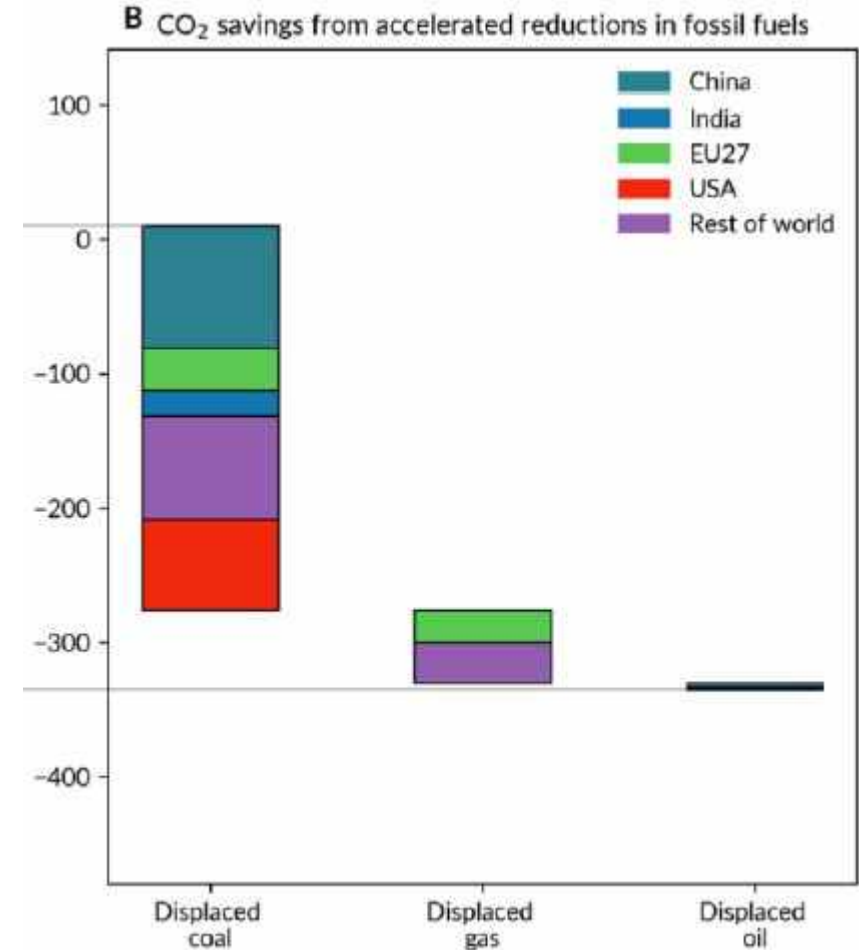
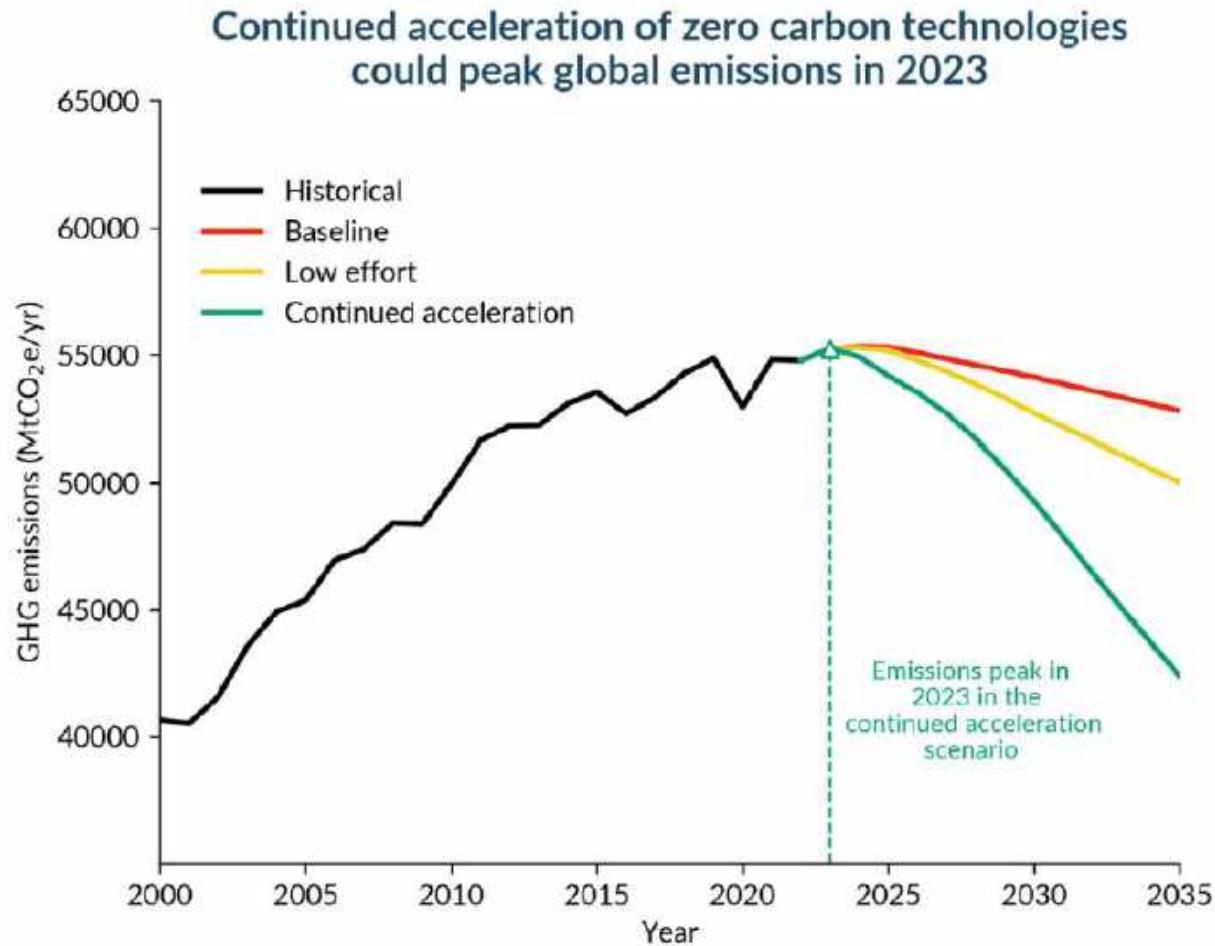
4. Regulations need to **exclude loopholes**.
Problem: “reward hacking” once AI is cognitively more powerful. Hope: IRL



3. All systems that have goals are by default optimizing resource acquisition □ Advanced AI will be **power seeking** to attain goal.
Hope: inverse reinforcement learning (IRL).



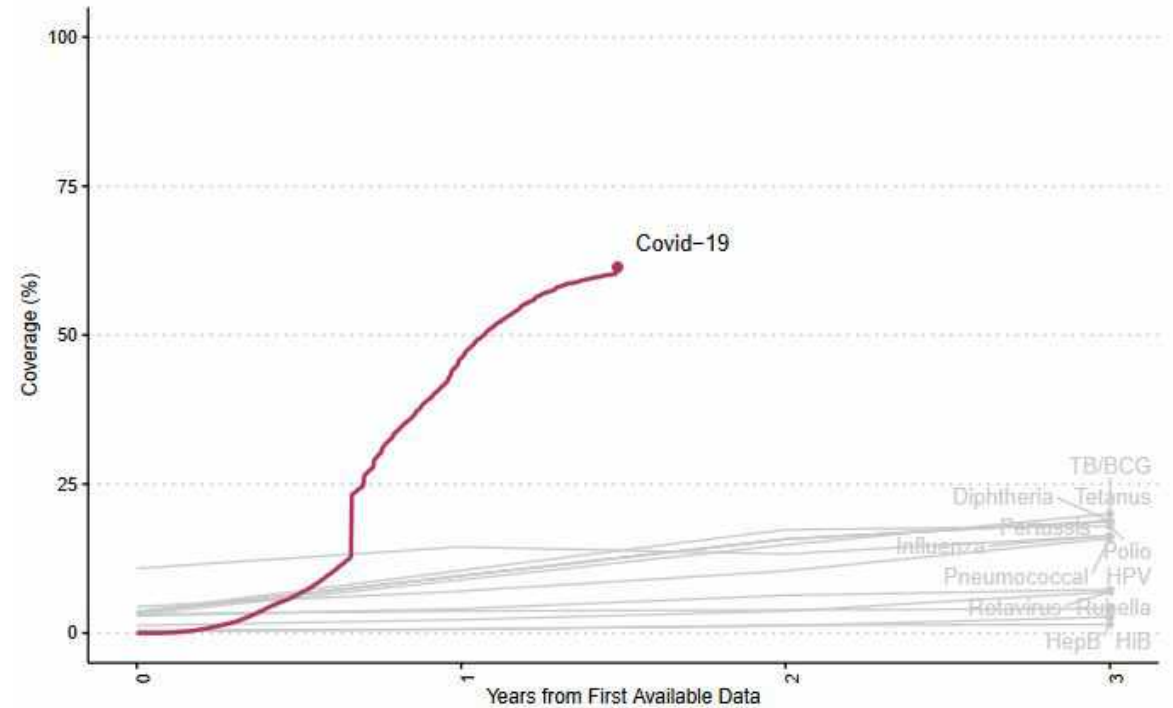
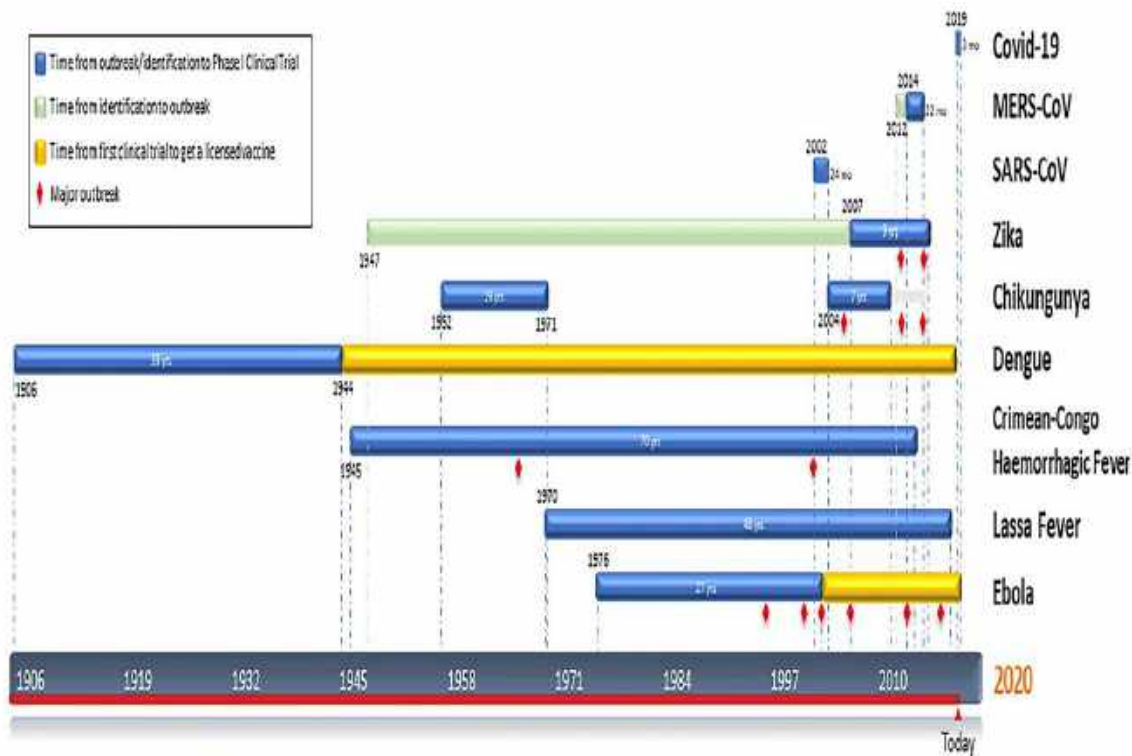
Is it still possible to stay in control? Let's look at other problems e.g. cutting CO2 emissions to curb climate change.



Can we be fast? Yes, we can.

Covid vaccine development was the fastest in history.

Global Covid vaccination was the fastest in history.



The EU AI Act is a very good first step.

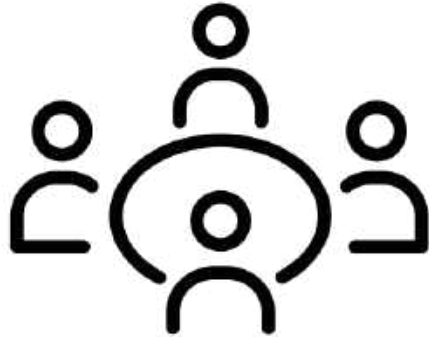
EU Artificial Intelligence Act: Risk levels



Which of these actions will you most likely be able to do?



Become more knowledgeable about AI.



Participate in the AI ethics committee at your institution.



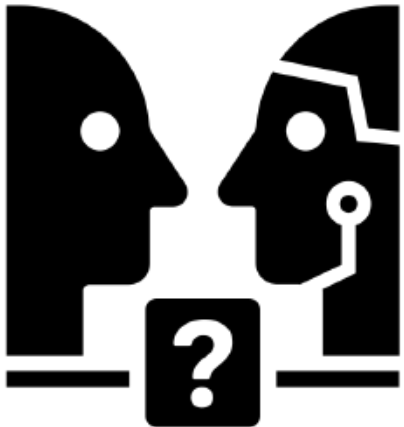
Attend an AI policy workshop and provide scientific perspective.



Organize an AI seminar in your department with a slide about AI awareness.

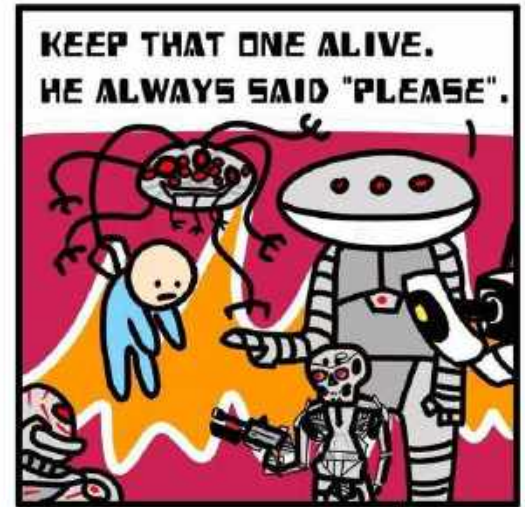
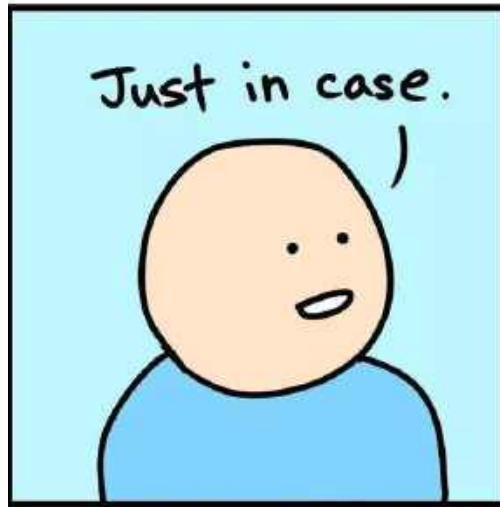


Join an initiative promoting responsible AI use in research.



Support research on AI alignment. So we will be able to align them with human welfare.

Why should you always say "please"?



seebangnow

?

!

Here are links to additional material.

- LinkedIn account with articles (e.g. how to install a local model):
<https://www.linkedin.com/in/daniel-mertens-05060814/>
- List of interesting tools for literature review and science (non-updated):
https://docs.google.com/document/d/1e8FFFUQoiOfNIJ5UdCA0Z6_Qno1LOCEcmvqnEETMka4/edit?usp=sharing
- List of interesting prompts:
https://docs.google.com/document/d/1lpKvjP_Ez4O8HdxH20AJzkLTVFgwXk_U/edit?usp=sharing&oid=113875646077349531174&rtpof=true&sd=true
- Papers:
<https://drive.google.com/drive/folders/12ZGPCJvorwJf1W2yLkk5AcJ7MH7AGWyE?usp=sharing>