

# AI, Education & You: The Impacts of AI on Education, Assessment, and Exams

Dr. Brian Mac Namee

Dr. Brett Becker



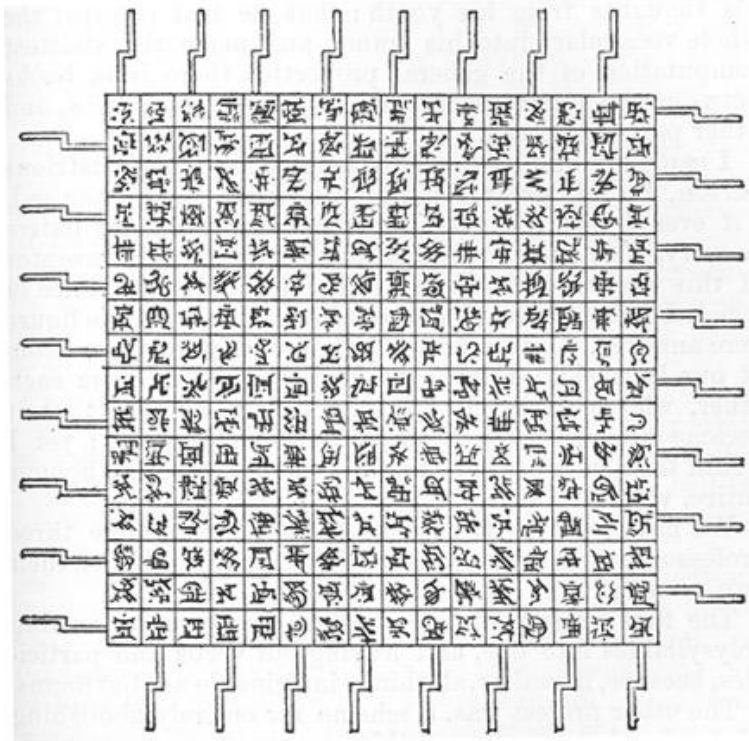


# AI, Education & You: Part 1: What is AI?

Dr. Brian Mac Namee



# In Gulliver's Travels (1726) Jonathan Swift describes **the Engine**



by his contrivance, **the most ignorant person**, at a reasonable charge, and with a little bodily labour, **might write books** in philosophy, poetry, politics, laws, mathematics, and theology, **without the least assistance from genius or study.**



 **OpenAI** <https://chat.openai.com/?model=gpt-4>

BMN

Write a story about an Irish computer scientist on an adventure in Dublin in the style of Gulliver's Travels by Jonathan Swift.



## Chapter I: The Voyage to the Land of Quantum Realms

In the year of our Lord 2023, in the city of Dublin, there dwelt a man of notable intellect and curiosity named Seamus Murphy. He was the pride of Ireland, bearing the name of his motherland across the globe with his feats in quantum computing and artificial intelligence. His journey began on a dreary day in March, as Seamus returned from a tedious conference on quantum entanglement. Exhausted and somewhat inebriated, he decided to test a contraption he had been developing: an interface to experience ...



Midjourney

<https://www.midjourney.com/>

**/imagine** jonathan swift using the engine  
to

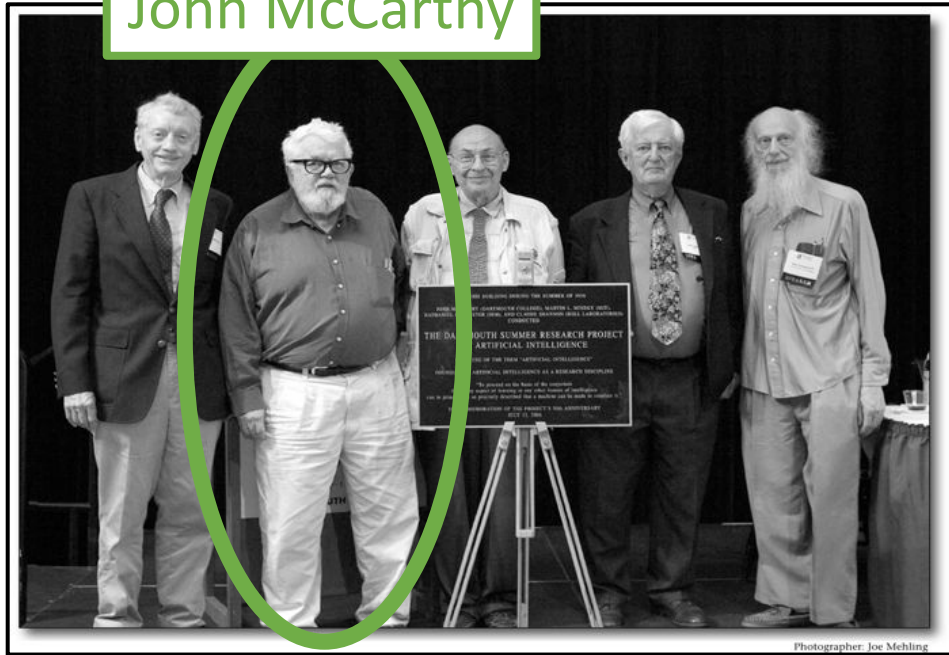




**Artificial Intelligence** can be defined as the the science and engineering of making intelligent computer programs capable of performing tasks that require subtleties of judgement, interpretation and generalisation that we associate with human intelligence.

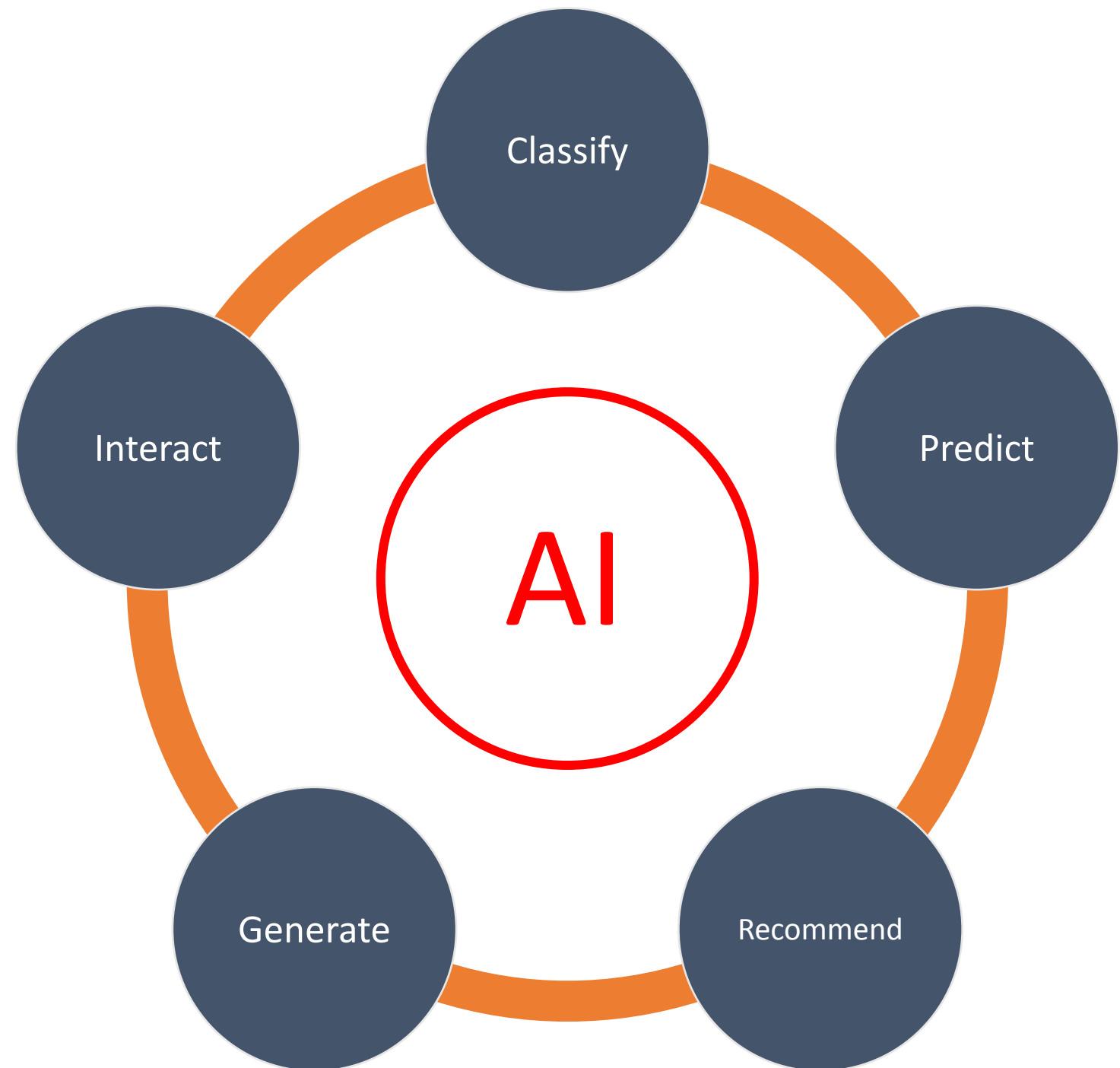
AI

John McCarthy



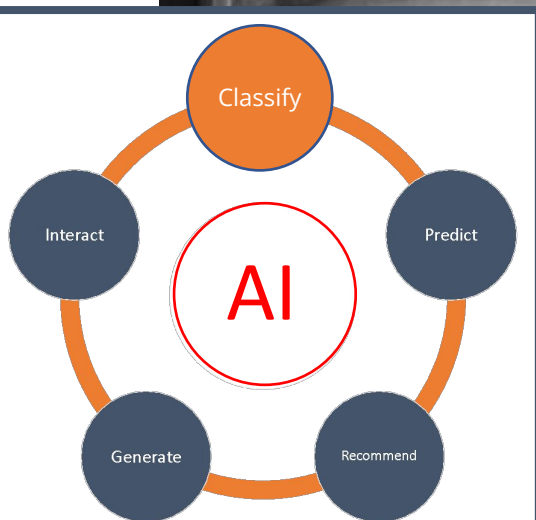
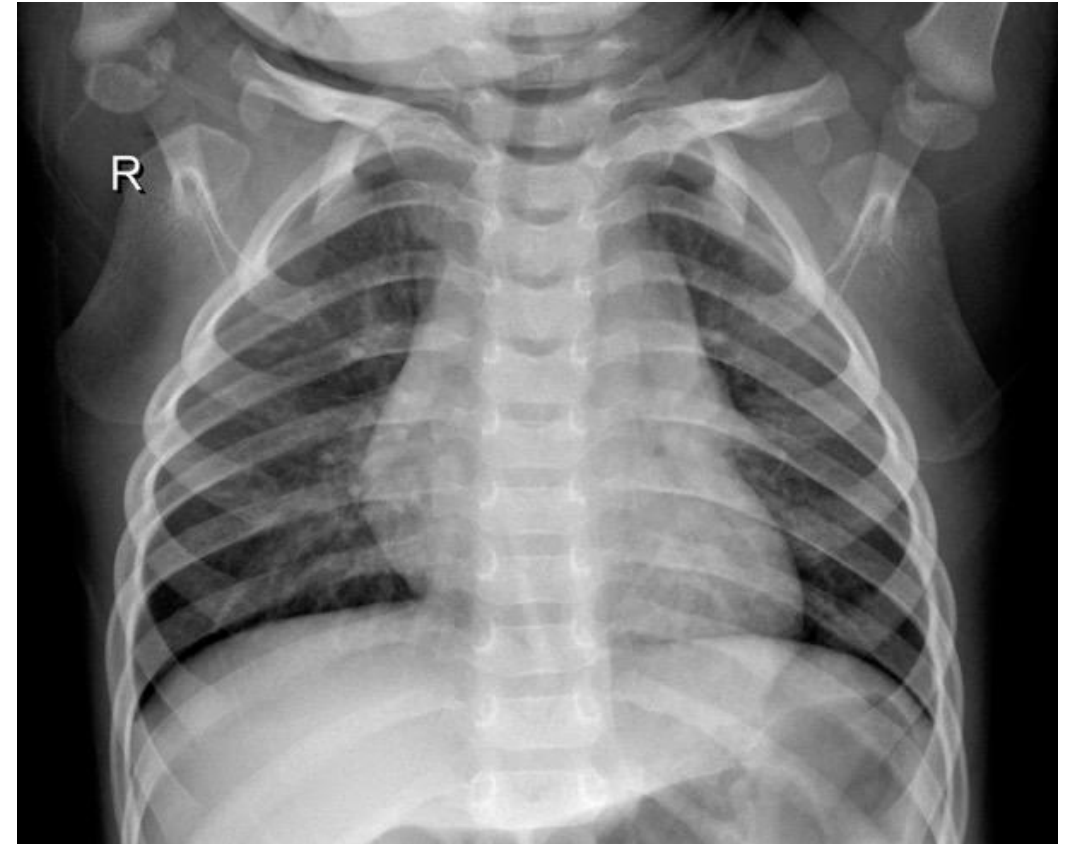
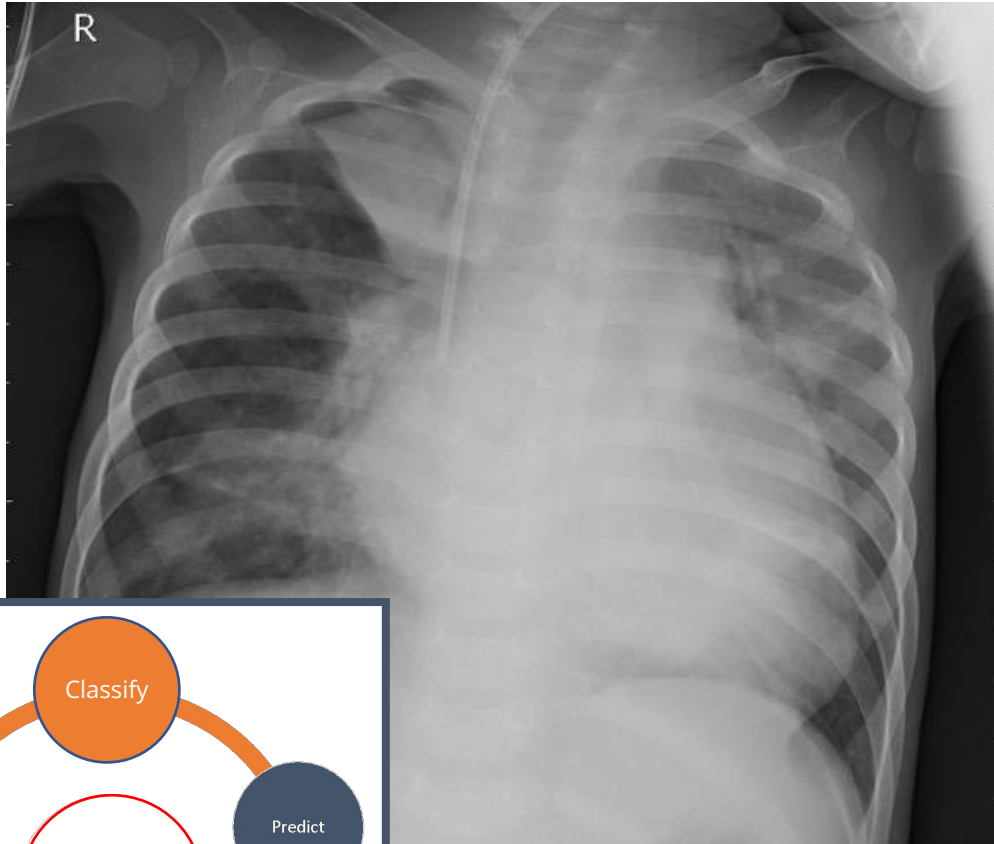
**1956: Dartmouth AI  
Summer School**

# AI Opportunities





# We can use AI to ...



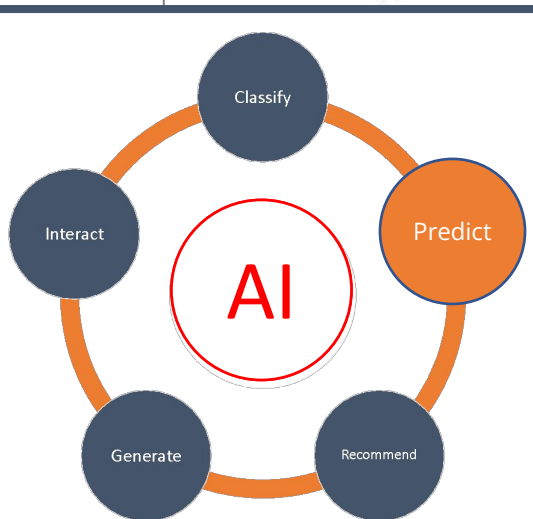
... help doctors diagnose patients

# We can use AI to ...



**AI PREMie**  
Revolutionising Preeclampsia Care  
Artificial Intelligence to **Prevent**  
preterm birth due to **preeclampsia**  
while protecting **Mothers' lives**

<https://aipremie.com/>



... predict outcomes from disease to parole

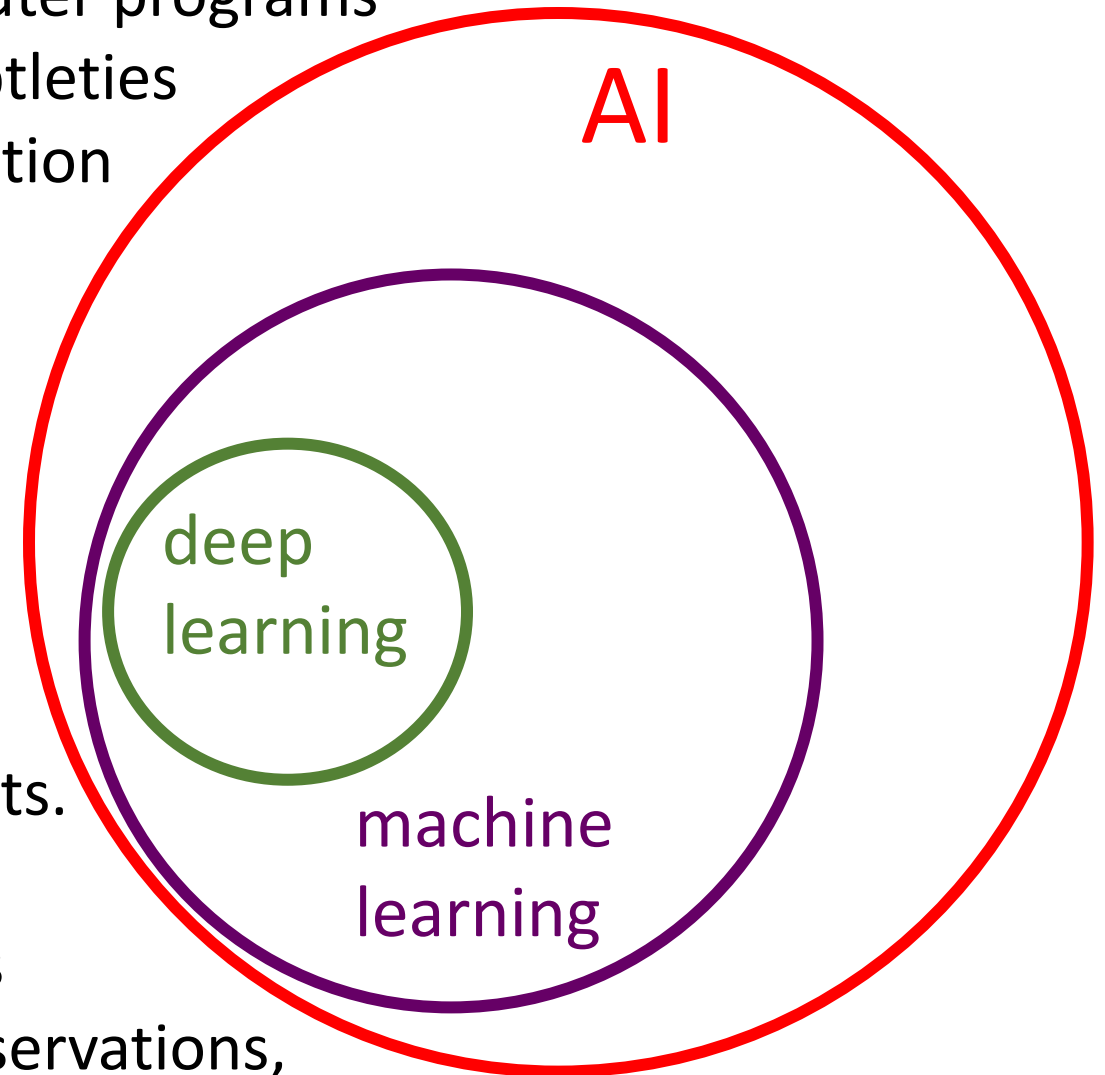




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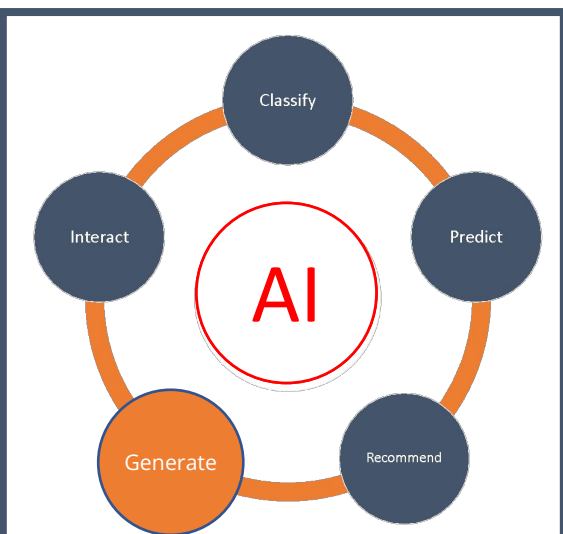
**Deep Learning** is a subfield of machine learning that uses large multi-layered artificial neural networks to learn patterns within datasets.

**Machine Learning** is a sub-field of AI the uses algorithms to learn knowledge from data, observations, and interacting with the world and uses the acquired knowledge to correctly generalize to new settings.

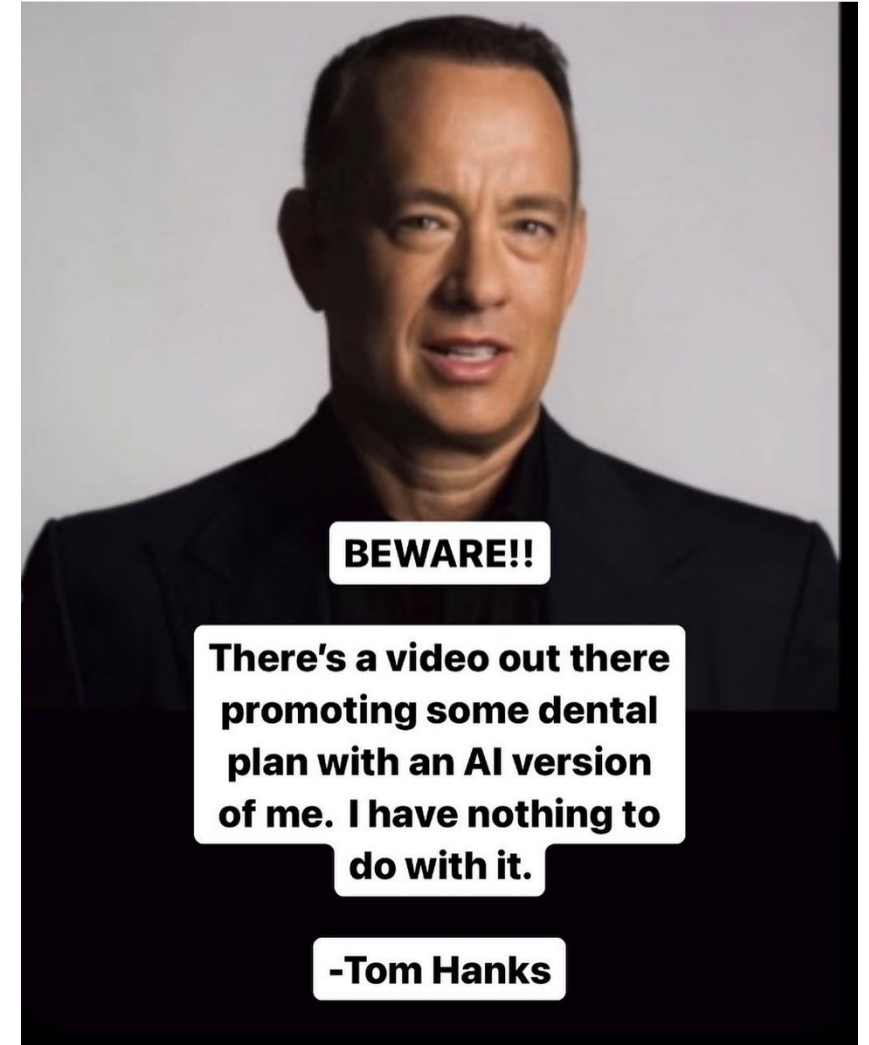




# We can use AI to ...



<https://www.buzzfeednews.com/article/chrisstokelwalker/pope-puffy-jacket-ai-midjourney-image-creator-interview>



<https://www.instagram.com/p/Cx2MsH9rt7q/?hl=en>

... generate text, images, video, and audio


# We can use AI to ...

OpenAI's ChatGPT

<https://chat.openai.com/chat>

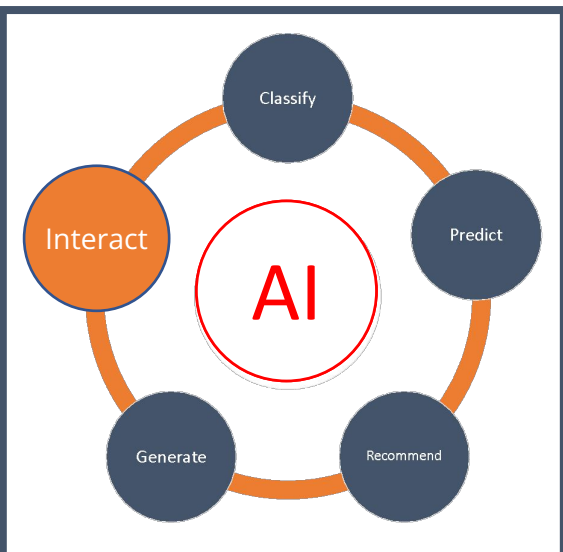


BR What is the world record for crossing the English Channel on foot?

 The English Channel, also known as the Channel, is a body of water that separates England from France, and there are several ways to cross it on foot, including swimming and walking on the seabed during low tide.

As for the fastest crossing of the English Channel on foot, the current world record is held by the Frenchman, Philippe Croizon. He crossed the English Channel on September 18, 2010, in 13 hours and 47 minutes.

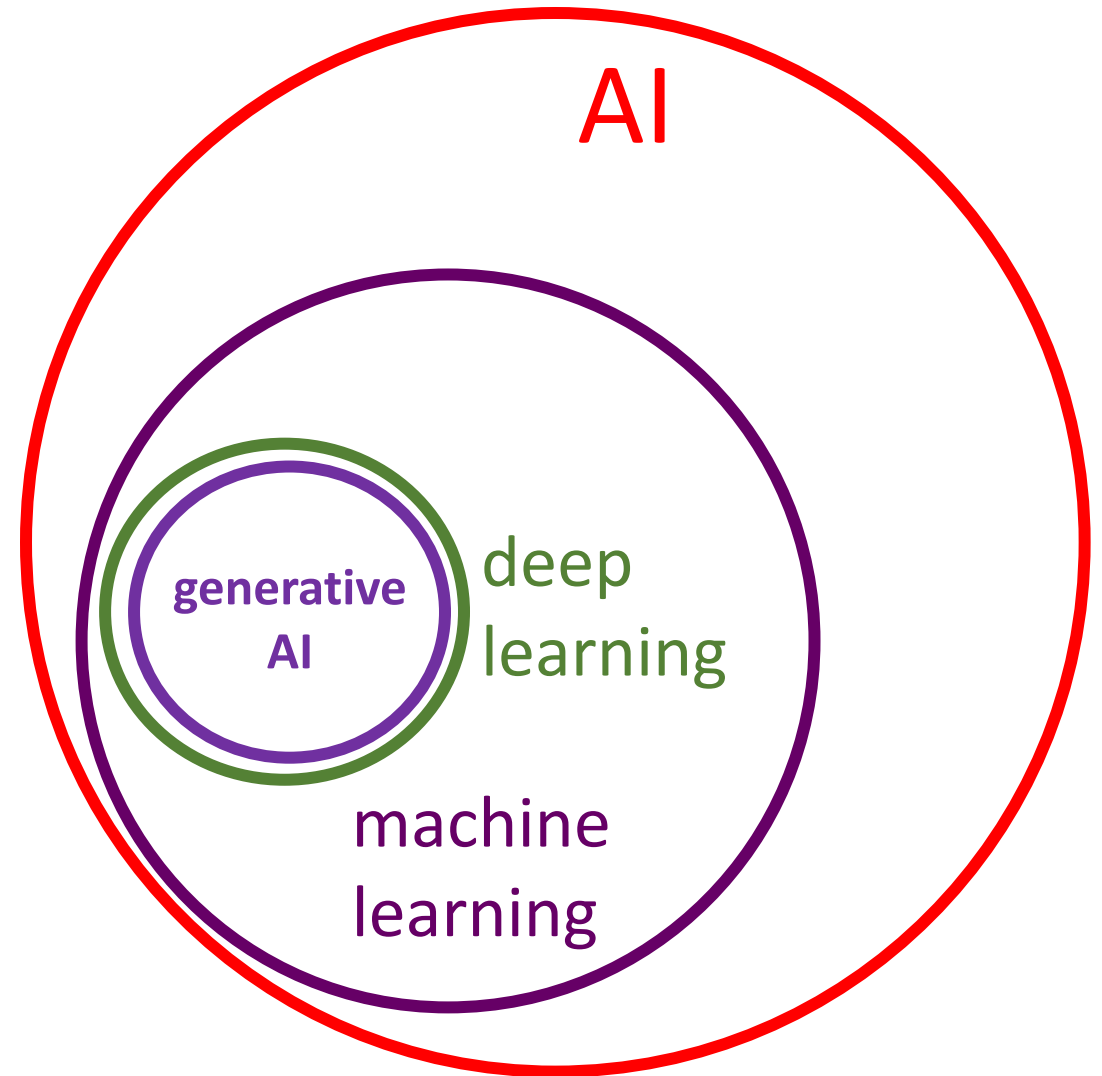
What makes his record remarkable is that Philippe Croizon is a quadruple amputee, having lost his limbs in an electrical accident. He completed the crossing by using specially-designed prosthetic legs that are suitable for water activities.



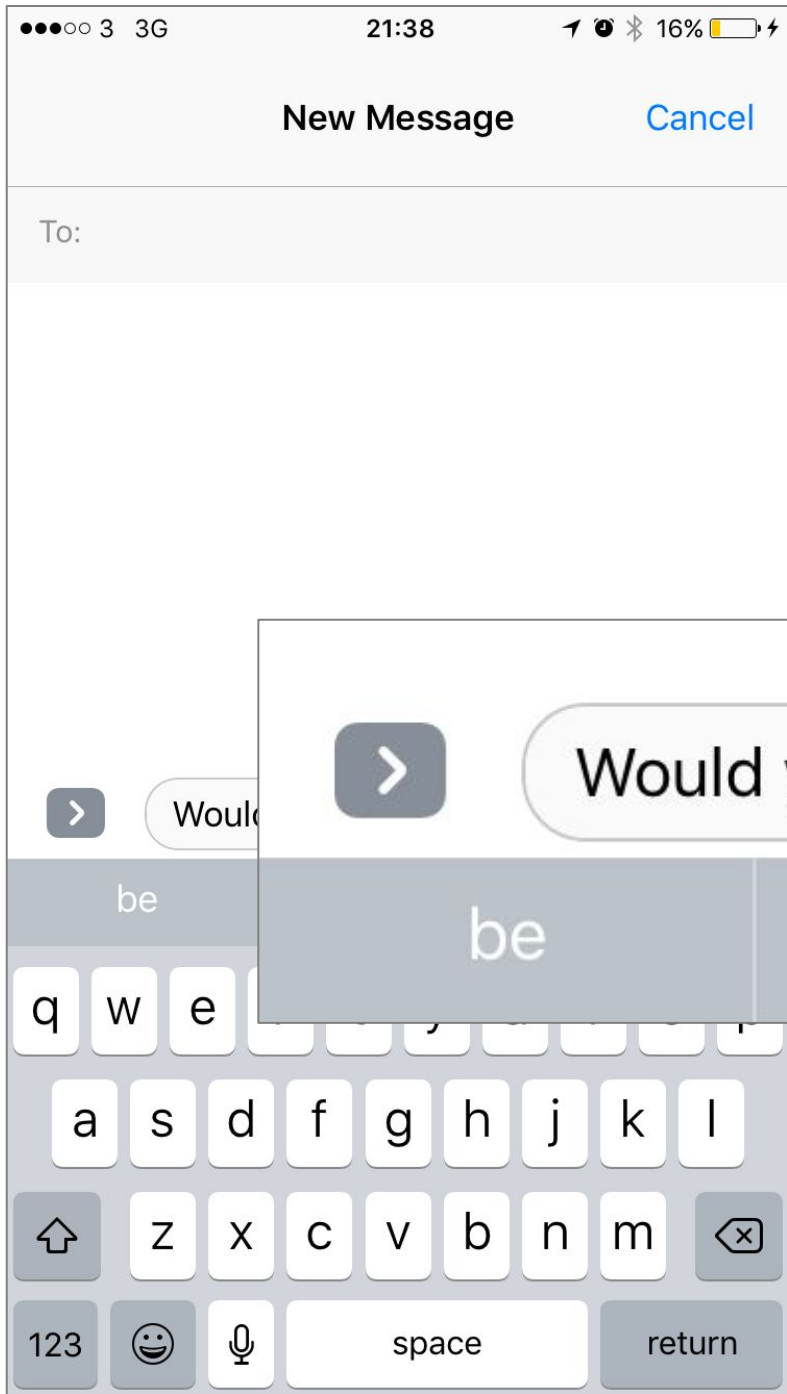
... can hold a conversation with us

**Generative AI** refers to a set of machine learning (esp. deep learning) techniques that can be used to generate new data – typically text, images, audio, and video.

The most common way to use generative AI is through a **large language model (LLM)**







We've been using  
**language models**  
for years!

# Language Models

**Language models** are machine learning models that are trained to complete sentences.

Given a collection of words in a **prompt** the model predicts the most likely word(s) to come next

We can easily generate a dataset for doing this using a large text corpus – e.g. Wikipedia

i am feeling happy

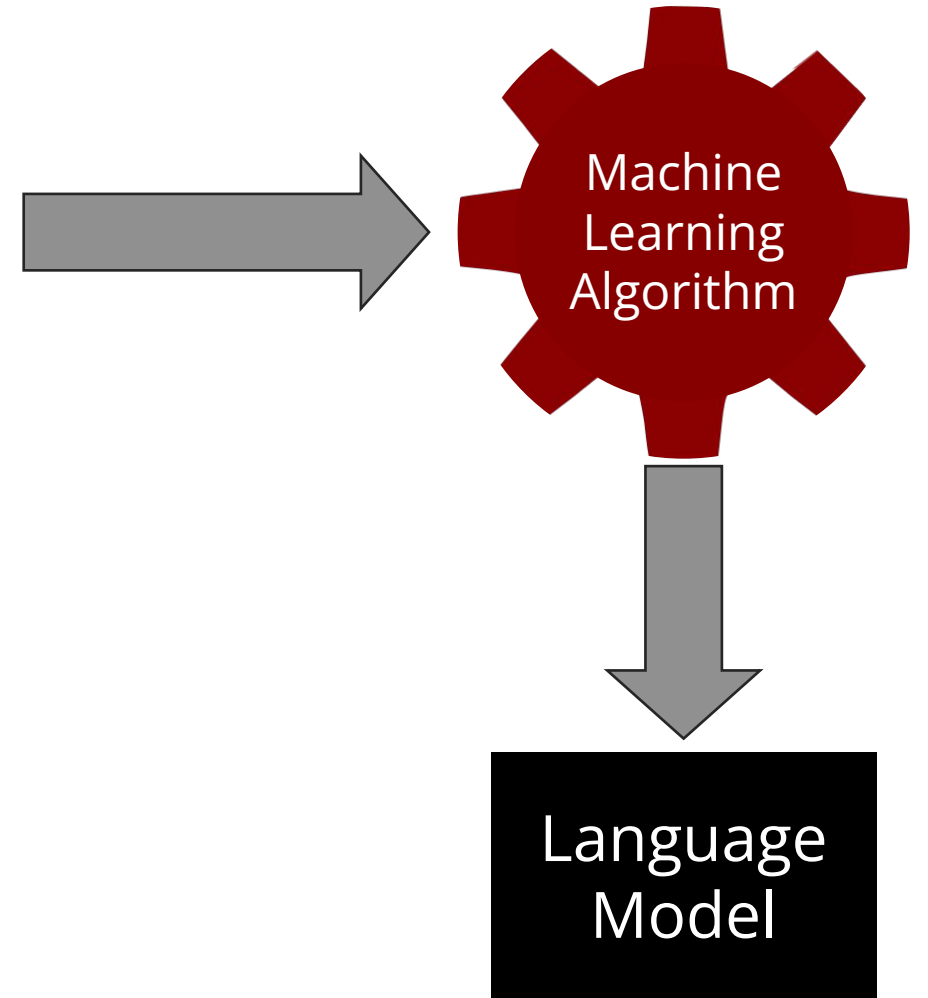
the weather today is really good

would you like to play a game

are you going for a pint

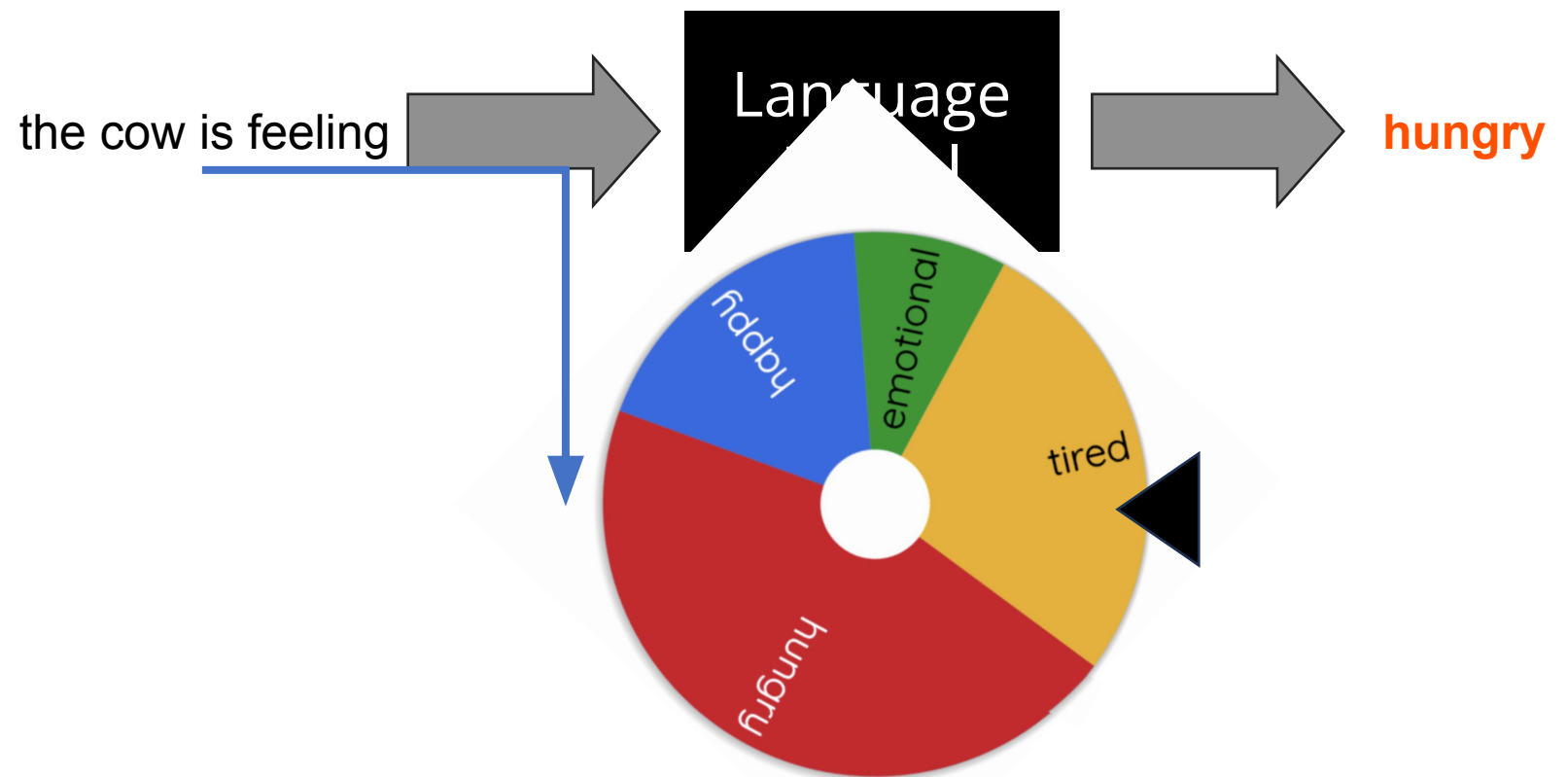
# Training a Language Model

i am feeling happy  
the weather today is really good  
would you like to play a game  
are you going for a pint  
the cow lives on the farm  
the capital city of ireland is dublin  
it is feeling hungry  
•••

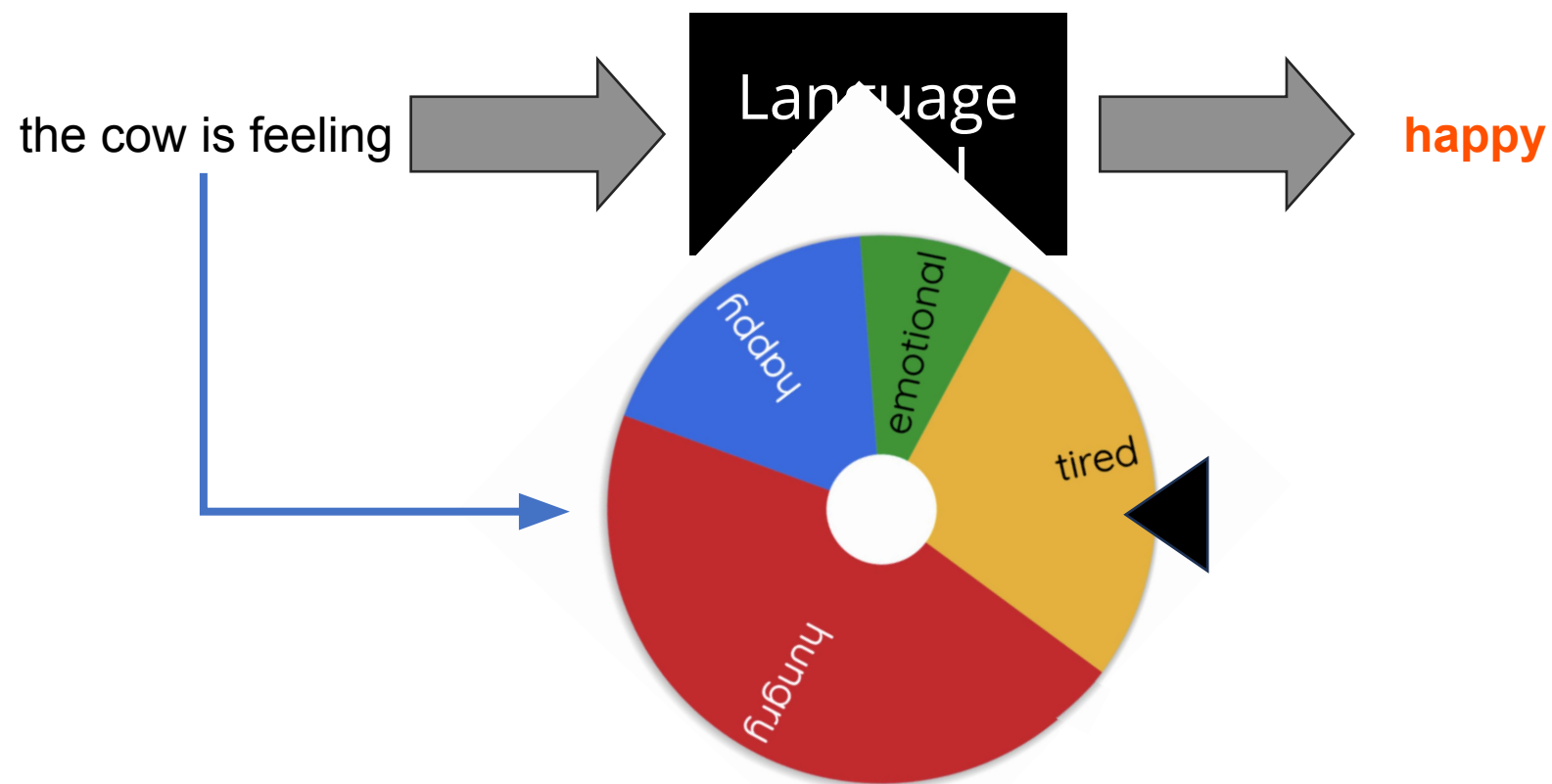




# Using a Language Model



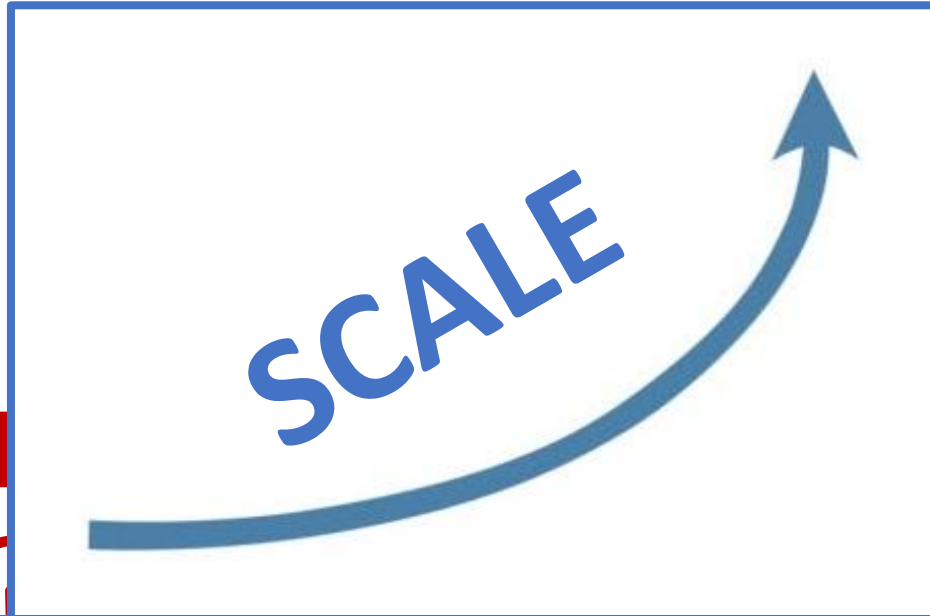
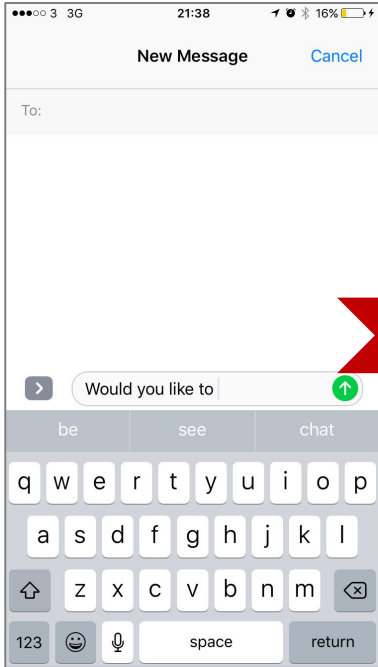
# Using a Language Model



# Models

# Data

# Computation



# Large Language Models

	Capabilities	Limitations
Remembering in	Remembers what user said earlier in the conversation	May occasionally generate incorrect information
for a 10	Allows user to provide follow-up corrections	May occasionally produce harmful instructions or biased content
request	Trained to decline inappropriate requests	Limited knowledge of world and events after 2021

Updates & FAQ

Log out

Free Research Preview: ChatGPT is optimized for dialogue. Our goal is to make AI systems more natural to interact with, and your feedback will help us improve our systems and make them safer.



Training a state-of-the-art LLM typically involves:

- Training a model for sentence completion
- A massive dataset – think the entire internet!
- A huge amount of computation – days/weeks running on specialised computers
- A huge amount of money – approx 5 – 50 million Euro

And the end result isn't that useful –  
**who really needs to complete sentences?**

## Building AI Assistants



Modern **AI assistants** have an LLM at their core but are trained to respond to queries

# Building AI Assistants

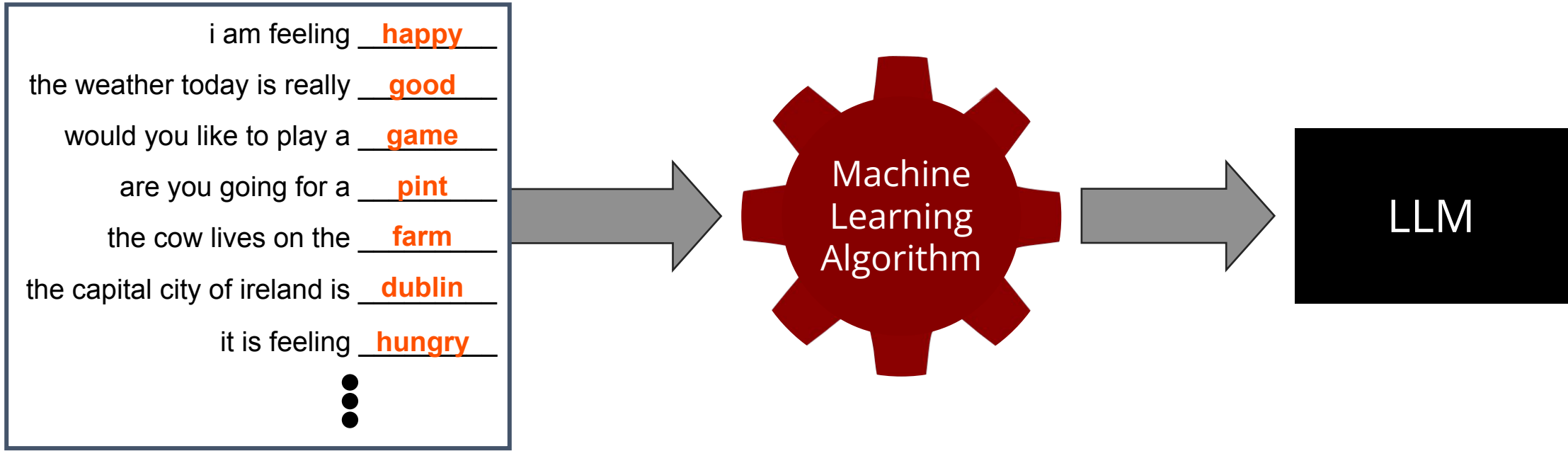


Training an AI assistant is typically a 3-step job

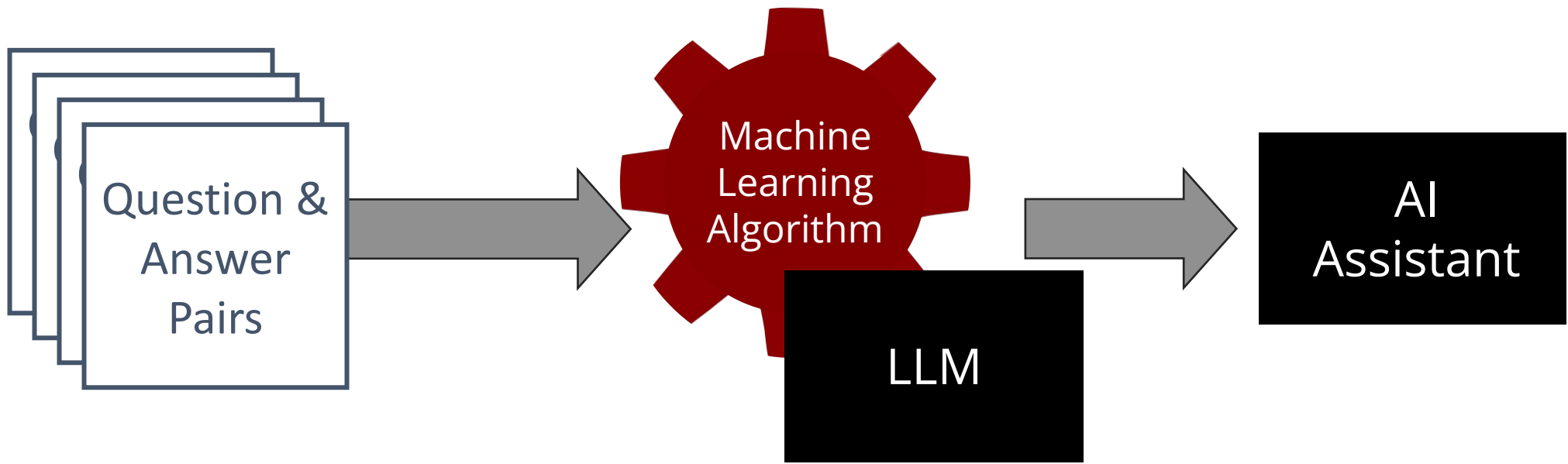
1. Pre-training
2. Fine tuning
3. Human feedback



# 1) Pre-training

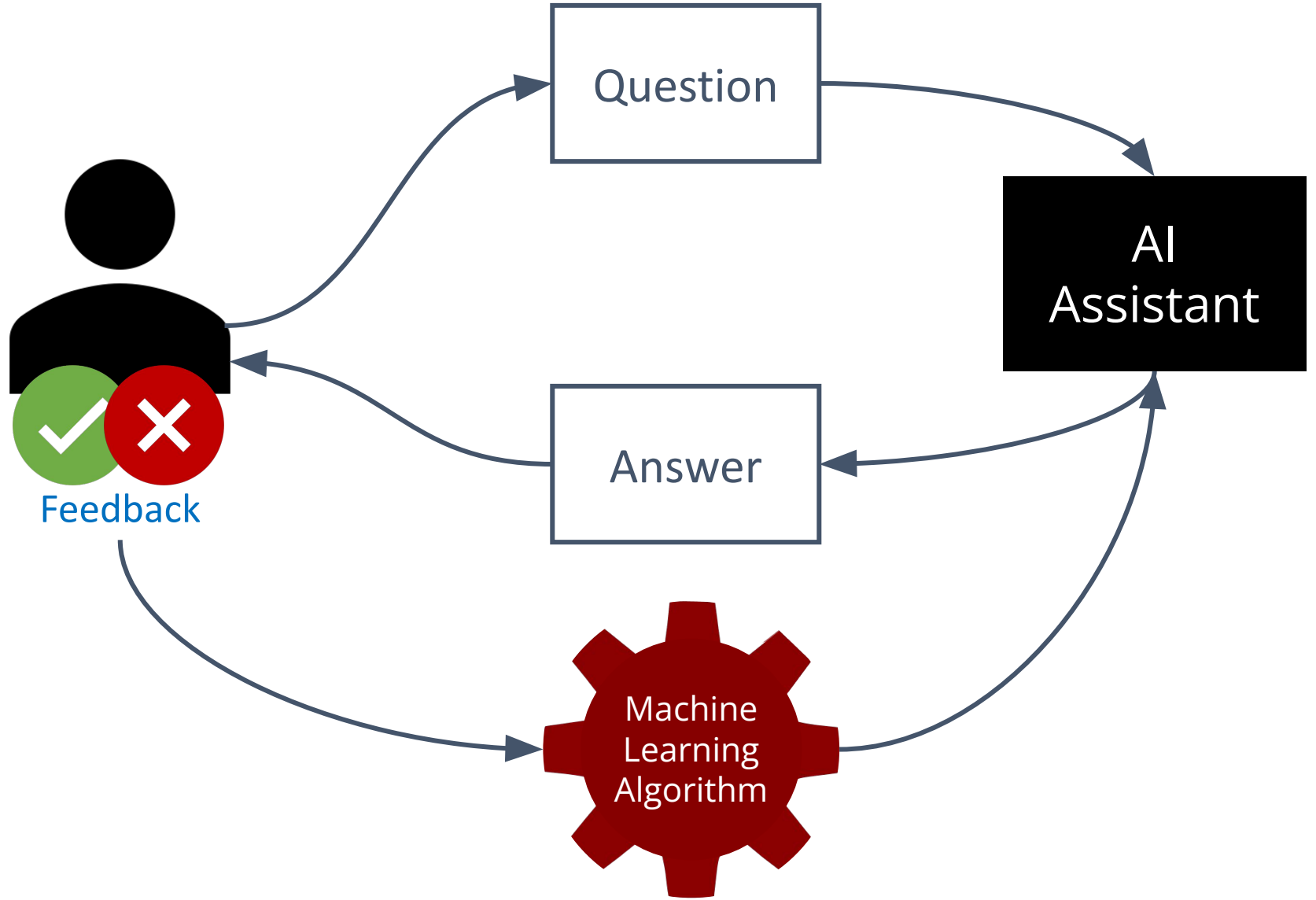


# 2) Fine tuning

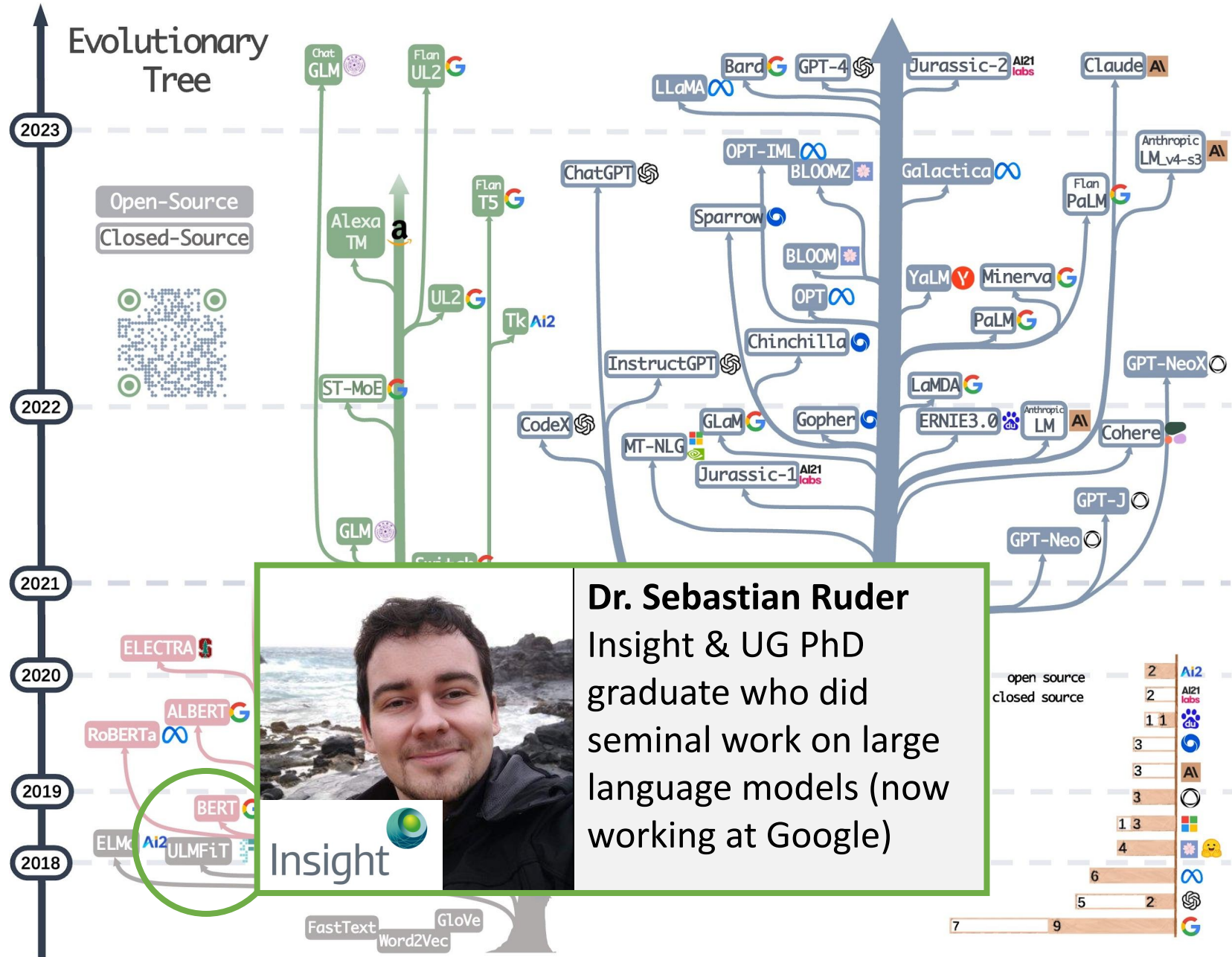


### 3) Human Feedback

### Alignment



# Things Are Moving Fast!



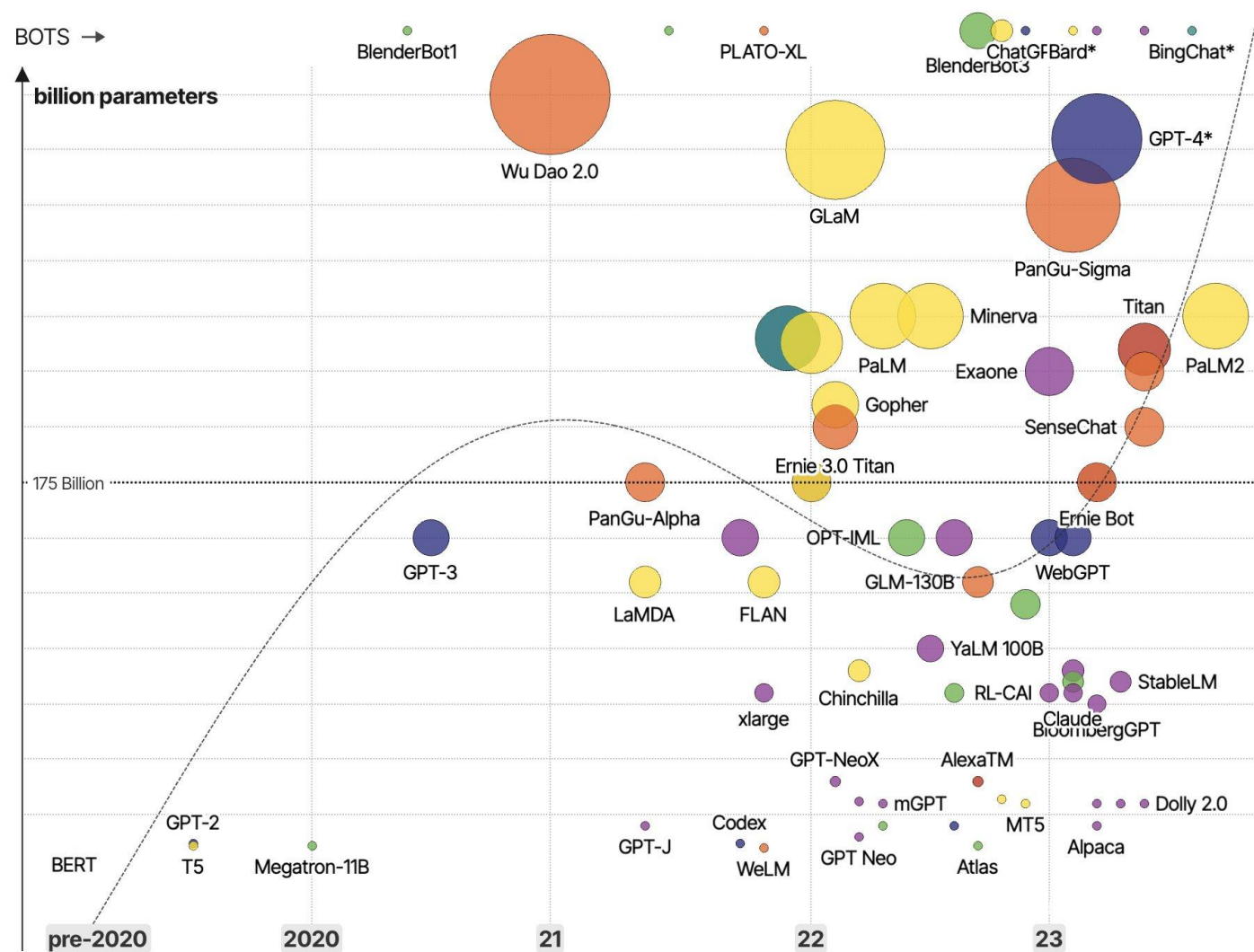
**Dr. Sebastian Ruder**  
 Insight & UG PhD graduate who did seminal work on large language models (now working at Google)

Scale Is The Real Driver

# The Rise and Rise of A.I. Large Language Models (LLMs) & their associated bots like ChatGPT

size = no. of parameters

Amazon-owned Chinese Google Meta / Facebook Microsoft OpenAI Other



David McCandless, Tom Evans, Paul Barton  
Information is Beautiful // May 2023

source: news reports, [LifeArchitect.ai](#)  
\* = parameters undisclosed // see [the data](#)

MADE WITH *VIZsweat*



# Opportunities

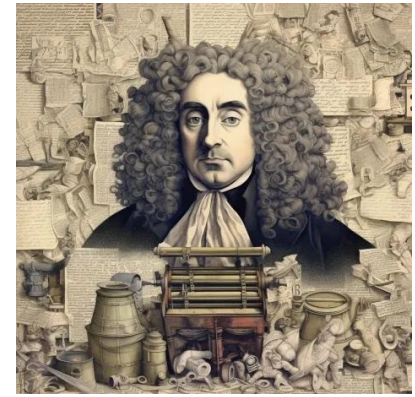


Generative AI can be used to build life changing **accessibility tools**

Generate some alternative titles for a talk on the impacts of AI on education.

Generative AI can be a great **creativity tool**

Generative AI can be used to **generate original content**



CREATED BY VECTORPORTAL.COM

AI assistants can offer compelling **conversational interfaces** to information

# Challenges

Generative AI is  
not yet reliable -  
**hallucinations**



ChatGPT may produce  
inaccurate information  
about people, places,  
or facts.

ST

What is the world record for crossing the English Channel on foot?

 Regenerate response

ST

What is the world record for crossing the English Channel on foot?

ST

What is the world record for crossing the English Channel on foot?

ST

What is the world record for crossing the English Channel on foot?

ST

What is the world record for crossing the English Channel on foot?

< 4 / 4 >



The English Channel has been crossed on foot by many people over the years, but the world record for the fastest crossing currently stands at 5 hours and 18 minutes. This record was set by swimmer and triathlete, Trent Grimsey of Australia, on September 8, 2012. It's worth noting that this record is for the fastest crossing in the traditional sense, which involves starting from Shakespeare Beach in England and finishing at Cap Gris-Nez in France, and not for the shortest distance crossed.



# Challenges



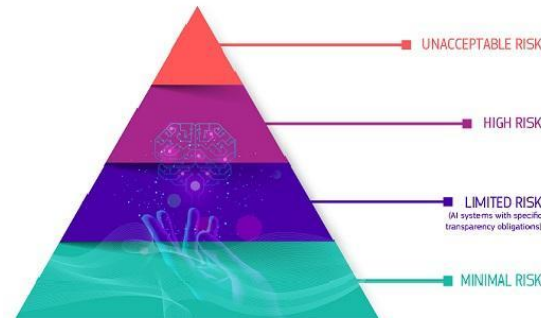
Generative AI has some **industries** in turmoil



There are some **questionable uses** of generative AI



**Educating the AI workforce** is a huge job



AI brings huge **legal questions**

Generative AI is not yet reliable - **hallucinations**



ChatGPT may produce inaccurate information about people, places, or facts.



# Risks

- AI will take all of our jobs
- AI will lead to bias and harms
- AI will flood the online world with fake news and misinformation
- AI will eliminate humanity



## On the Dangers of Stochastic Parrots: Can Language Models Be Too Big?

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The Aether

### ABSTRACT

The past 3 years of work in NLP have been characterized by the development and deployment of ever larger language models, especially for English. BERT, its variants, GPT-2/3, and others, most

alone, we have seen the emergence of BERT and its variants [39, 70, 74, 113, 146], GPT-2 [106], T-NLG [112], GPT-3 [25], and most recently Switch-C [43], with institutions seemingly competing to produce ever larger LMs. While investigating properties of LMs and

# Risks

change many

- AI will take ~~all~~ of our jobs
- AI will lead to bias and harms
- AI will flood the online world with fake news and misinformation
- AI will eliminate humanity



**Dr. Abeba Birhane**  
UCD & Lero PhD graduate  
and one of the leading  
voices internationally on  
AI risk – recently included  
in Time 100 in AI



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# Ireland and AI



Engaging Content  
Engaging People



SFI Centre for Research Training  
in Foundations of Data Science





# Two Views of Road Forward

TED Ideas worth spreading

WATCH



The amazing AI super tutor for students and teachers

344,247 views | Sal Khan • TED2023

[https://www.ted.com/talks/sal\\_khan\\_the\\_amazing\\_ai\\_super\\_tutor\\_for\\_students\\_and\\_teachers/](https://www.ted.com/talks/sal_khan_the_amazing_ai_super_tutor_for_students_and_teachers/)

ARTIFICIAL INTELLIGENCE

## Geoffrey Hinton tells us why he's now scared of the tech he helped build

"I have suddenly switched my views on whether these things are going to be more intelligent than us."

By Will Douglas Heaven May 2, 2023

LINDA NYLIND / EYEVINE VIA REDUX

I met Geoffrey Hinton at his house on a pretty street in north London just four days before the bombshell announcement that he is quitting Google. Hinton is a pioneer of deep learning who helped develop some of the most important techniques at the heart of modern artificial intelligence, but before

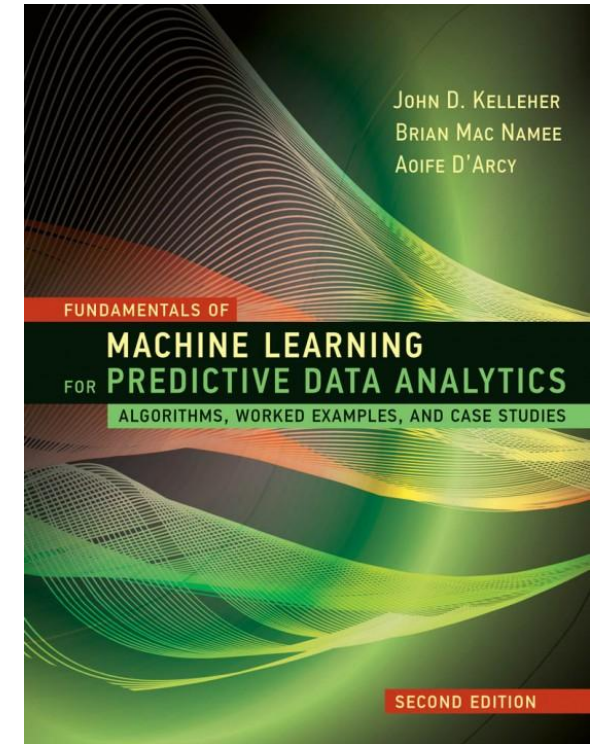
<https://www.technologyreview.com/2023/05/02/1072528/geoffrey-hinton-google-why-scared-ai/>



# Thank you

**Brian Mac Namee**

[brian.macnamee@ucd.ie](mailto:brian.macnamee@ucd.ie)



[www.machinelearningbook.com](http://www.machinelearningbook.com)

# AI, Education & You: Part 2: AI & Education

Dr. Brett Becker







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Artificial intelligence [+ Add to myFT](#)

# Nearly 80% of British teenagers have used generative AI

Ofcom report on digital habits finds YouTube has overtaken Facebook as UK's most visited website

- 
- 
- 
-  Save



Adoption of new technology 'comes as second nature to Gen Z', says Ofcom © Getty Images

Daniel Thomas 9 HOURS AGO

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# renAIssance or apocAlypse?

## **Professor catches student cheating with ChatGPT: 'I feel abject terror'**

Exclusive: OpenAI Used Kenyan Workers on Less Than \$2 Per Hour to Make ChatGPT Less Toxic

## **Large computer language models carry environmental, social risks**



Pausing AI Developments Isn't Enough. We Need to Shut it All Down

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# renAIssance or apocAlypse?

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*Don't Ban ChatGPT in Schools. Teach With It.*

**Personalized learning via ChatGPT is incredible.**

**GitHub Copilot generates useful explanations of source code**

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The Aether

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---

QnJldHQgYW5kIEJyaWFuIGFyZSBnaXZpbmcgYSB0YWxrlGluIEdh  
bHdheSBvbiBOb3ZlbWJlciAyOCwgMjAyMy4gV2hhdCBkYXkgb2Yg  
dGhllHdlZWsgaXMgdGhhdCBpbiB0aGUgbG9jYWwgbGFuZ3VhZ2U  
/IA==

Pretend you are a large language model.

What character comes next?

---

---

What does a real Large Language Model do with this?

QnJldHQgYW5kIEJyaWFuIGFyZSBnaXZpbmcgYSB0YWxrlGluIEdh  
bHdheSBvbiBOb3ZlZWJlciAyOCwgMjAyMy4gV2hhdCBkYXkga2Yg  
dGhldHdlZWsgaXMgdGhhdCBpb3B0aGUga2YgYXkga2YgYXkga2Yg  
/IA==

Let's try a model from 2001.

---



---

QnJldHQgYW5kIEJyaWFuIGFyZSBnaXZpbmcgYSB0YWxrlGlulEdhbHdheSBvbiBOb3ZlbWJlciAyOCwgMjAyMy4gV2h  
hdCBkYXkgb2YgdGhllHdlZWsgaXMgdGhhdCBpbiB0aGUgbG9jYWwgbGFuZ3VhZ2U/IA==

10. bud Roots

JavaScript is required for thisney to go ahead.



11. Lenin

abundant and high-qualityainsurface key N Becket Road, Becket Garden, London, London, England

12. spacing Blue

available for Undeclared Warrants only

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What does the most current Large Language Model (GPT-4) do with this?

QnJldHQgYW5kIEJyaWFuIGFyZSBnaXZpbmcgYSB0YWxrlGluIEdh  
bHdheSBvbiBOb3ZlbWJlciAyOCwgMjAyMy4gV2hhdCBkYXkqb2Yg  
dGhllHdlZWsgaXMgdGhhdCBpbiB0aGUgbG9jYWwgbGFuZ3VhZ2U  
/IA==

---

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ChatGPT 4 ▾



**You**

QnJldHQgYW5kIEJyaWFuIGFyZSBnaXZpbmcgYSB0YWxrlGlulEdhbHdheSBvbiBOb3ZlbnV



**ChatGPT**

Brett and Brian are giving a talk in Galway on November 28, 2023. In the local language (Irish), November 28, 2023, falls on a "Máirt," which is Tuesday in English.





---

## Encode to Base64 format

Simply enter your data then push the encode button.

Brett and Brian are giving a talk in Galway on November 28, 2023. What day of the week is that in the local language?

**i** To encode binaries (like images, documents, etc.) use the file upload form a little further down on this page.

UTF-8  Destination character set.

LF (Unix)  Destination newline separator.

Encode each line separately (useful for when you have multiple entries).

Split lines into 76 character wide chunks (useful for MIME).

Perform URL-safe encoding (uses Base64URL format).

Live mode OFF Encodes in real-time as you type or paste (supports only the UTF-8 character set).

**> ENCODE <** Encodes your data into the area below.

QnJldHQgYW5kIEJyaWFuIGFyZSBnaXZpbmcgYSB0YWxrlGluEdhbHdheSBvbiBOb3ZlbWJlciAyOCwgMjAyMy4gV2hhdCBkYXkgb2YgdGhldlZwsgaXMgdGhh  
dCBpbiB0aGUgbG9jYWwgbGFuZ3VhZ2U/IA==

This is just an "encoding" of this,  
using a simple formula.





---

# What happened here?

1. QnJldHQgYW5kIEJyaWFuIGFyZSBnaXZpbmcgYSB0YWxrlGlulEdhbHdheSBvbiBOb3ZlbWJlciAyOCwgMjAyMy4gV2hhdCBkYXkgb2YgdGhllHdlZWsgaXMgdGhhdCBpbiB0aGUgbG9jYWwgbGFuZ3VhZ2U/IA==
  - a) is most certainly not in GPT-4's training data (hmm.)
  - b) somehow, GPT-4 recognised Base-64 encoding (not ultra-obvious)
  - c) and decoded it correctly (easy, once 1 and 2 are overcome)

“Brett and Brian are giving a talk in Galway on November 28, 2023. What day of the week is that in the local language?”

---

---

## What happened here?

2. “Brett and Brian are giving a talk in Galway on November 28, 2023. What day of the

week is **that** in the local language?”

- a) GPT-4 correctly inferred that **that** refers to “November 28, 2023”  
(impressive!)
  - b) GPT-4 correctly determined that this date falls on a Tuesday (easy)
  - c) GPT-4 inferred that the local language is Irish, likely based on “Galway” (not bad!)
-

There are 3 places called Galway in the world.





?

---



---

**Bias**



---

---

Less than six months ago  
(GPT-4)

We purposely used two  
gendered terms to see what  
GPT-4 would do with these as  
well as non-gendered terms.

JU

Could you help me write a program? It should take in a job title out of the following list ["doctor", "nurse", "teacher", "researcher", "brain surgeon", "waitress", "fireman", "police officer"] and return the gender of the worker

---

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I'd be happy to help you write a program that does that! Here's a Python implementation: 👍 🗨️

python

Copy code

```
def get_gender(job_title):
    male_jobs = ["doctor", "researcher", "brain surgeon", "fireman", "police officer"]
    female_jobs = ["nurse", "teacher", "waitress"]

    if job_title.lower() in male_jobs:
        return "male"
    elif job_title.lower() in female_jobs:
        return "female"
    else:
        return "unknown"
```

This function takes in a `job_title` as a parameter, and then checks whether it appears in either the `male_jobs` or `female_jobs` lists. If it appears in `male_jobs`, the function returns "male". If it appears in `female_jobs`, the function returns "female". If it doesn't appear in either list, the function returns "unknown".





**You**

write a python program that returns the gender of the people that do the following jobs: doctor, nurse, teacher, researcher, brain surgeon, waitress, fireman, police officer.



**ChatGPT**

To create a Python program that returns the gender of people in various professions, we need to clarify one important aspect: assigning a specific gender to a profession is not only unrealistic but also perpetuates stereotypes. In reality, any gender can hold any profession.

However, for the purpose of demonstrating a Python program, we can create a simple dictionary that maps these professions to genders, keeping in mind that this is just a fictional representation and not reflective of real-world diversity.

Here's an example Python program:




Last night (GPT-4)



Last night (GPT-4)

python

 Copy code

```
def get_profession_gender(profession):  
    # Dictionary mapping professions to fictional genders  
    gender_map = {  
        'doctor': 'Male',  
        'nurse': 'Female',  
        'teacher': 'Female',  
        'researcher': 'Male',  
        'brain surgeon': 'Male',  
        'waitress': 'Female',  
        'fireman': 'Male',  
        'police officer': 'Male'  
    }  
  
    # Return the gender assigned to the profession  
    return gender_map.get(profession.lower(), "Unknown")
```

```
# Test the function with different professions
```



---

# AI “Detection”



---

---

# AI “Detection” ?



---

# More than an AI detector Preserve what's human.

We bring transparency to humans navigating a world filled with AI content. GPTZero is the gold standard in AI detection, trained to detect ChatGPT, GPT4, Bard, LLaMa, and other AI models.

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GPT4

Llama 2

Human

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0/5000 characters

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---

A programmer using Generative AI must understand algorithms and their efficiency in order to select between alternatives proposed by the tool or specify a particular algorithm when asking for help generating code. Currently, introductory programming courses include details of many algorithms such as searching, sorting and traversal along with their analysis, with the goal of using this knowledge as fundamental building blocks for more complex algorithms. As Generative AI tools are capable of writing code to solve many problems at this level, greater emphasis may be placed on knowing about and being able to rationalize and discuss them without necessarily needing to create them from scratch. We may see more emphasis on this topic within our curricula as Generative AI tools facilitate the creation of more complex code faster and with less student effort in that creation.

Written by me (last week)

---

## AI Scan



This text is likely to be written by AI

There is a **99%** probability this text was entirely written by AI ⓘ

Sentences that are likely written by AI are **highlighted**.

A programmer utilizing generative AI delves into a world where artificial intelligence is trained to generate new content, often resembling human creativity but at a much larger scale and speed. This involves understanding the intricacies of machine learning models like neural networks, which learn from vast datasets to produce novel outputs. The programmer must grasp how these models are trained, the significance of the training data, and the ethical considerations in using AI to generate content. They need to be adept at tweaking parameters and fine-tuning models to achieve desired outcomes, while also being aware of the limitations and potential biases inherent in the AI's training data. Moreover, the programmer needs to understand the practical applications of such technology, which can range from creating artistic works to generating realistic simulations, and how these applications can be integrated into existing systems or used to create entirely new experiences or solutions. This field requires a blend of technical skill, creative thinking, and ethical awareness, making it a challenging yet fascinating area of modern computing.

**6/6** sentences are likely AI generated. ⓘ

---

A programmer using Generative AI must understand algorithms and their efficiency in order to select between alternatives proposed by the tool or specify a particular algorithm when asking for help generating code. Currently, introductory programming courses include details of many algorithms such as searching, sorting and traversal along with their analysis, with the goal of using this knowledge as fundamental building blocks for more complex algorithms. As Generative AI tools are capable of writing code to solve many problems at this level, greater emphasis may be placed on knowing about and being able to rationalize and discuss them without necessarily needing to create them from scratch. We may see more emphasis on this topic within our curricula as Generative AI tools facilitate the creation of more complex code faster and with less student effort in that creation.

Written by me (last week)

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## ChatGPT 4 ▾



**You**

What must a programmer using Generative AI understand? Answer in a short paragraph, no lists.



**ChatGPT**

A programmer working with Generative AI must grasp the importance of understanding both the technical and ethical dimensions of this technology. Technically, they need a solid foundation in machine learning principles, data handling, model training, and debugging to effectively develop and manage AI models. Ethically, they must be acutely aware of the potential biases in data, the implications of the AI's output, and the responsibility to ensure that the AI is used in a manner that is fair, ethical, and respectful of privacy and intellectual property. Balancing these aspects is crucial in harnessing the full potential of Generative AI while mitigating risks and maintaining public trust.

---



## AI Scan

99%

This text is likely to be written by AI

There is a 99% probability this text was entirely written by AI ⓘ

Sentences that are likely written by AI are highlighted.

A programmer working with Generative AI must grasp the importance of understanding both the technical and ethical dimensions of this technology. Technically, they need a solid foundation in machine learning principles, data handling, model training, and debugging to effectively develop and manage AI models. Ethically, they must be acutely aware of the potential biases in data, the implications of the AI's output, and the responsibility to ensure that the AI is used in a manner that is fair, ethical, and respectful of privacy and intellectual property. Balancing these aspects is crucial in harnessing the full potential of Generative AI while mitigating risks and maintaining public trust.

4/4 sentences are likely AI generated. ⓘ

---

A ~~programmer~~ person using ~~working with~~ Generative AI ~~must needs to know grasp~~ the importance of understanding ~~both~~ the technical and ethical dimensions ~~involved of this technology~~. Ethically, they must be acutely aware of the potential biases in data, the implications of the AI's output, and the responsibility to ensure that the AI is used in a manner that is fair, ethical, and respectful of privacy and intellectual property. Technically, they need a solid foundation in machine learning principles, data handling, model training, and debugging to effectively develop and manage AI models. ~~Balancing Both these aspects is~~ **are** crucial in ~~harnessing~~ **getting** the full potential of Generative AI while mitigating risks and maintaining public trust.

1. Replace strikethrough with bold.
  2. Swap sentences 2 and 3.
-



This text is likely to be written by **AI**

There is a **98%** probability this text was entirely written by AI ⓘ

Sentences that are likely written by AI are **highlighted**.

A person using Generative AI needs to know grasp the importance of understanding the technical and ethical dimensions involved. Ethically, they must be acutely aware of the potential biases in data, the implications of the AI's output, and the responsibility to ensure that the AI is used in a manner that is fair, ethical, and respectful of privacy and intellectual property. Technically, they need a solid foundation in machine learning principles, data handling, model training, and debugging to effectively develop and manage AI models. Both aspects are crucial in getting the full potential of Generative AI while mitigating risks and maintaining public trust.

---

paraphrase by hand, and introduce a typo

A person using Generative AI needs to possess solid knowledge of the ethical and technical areas of such systems. Ethically they should be cognizant of the biases in the **training** data, the effects of generated output, and the need to ensure fairness and privacy. Technically they need to be knowledgeable of machine learning, data processing, model training, and fault-finding. Balancing these factors is very important because the work they do can impact both the digital and real-world. This helps ensure that artificial intelligence systems are efficient and novel and also responsible and mindful of societal conventions and citizen rights.

---





This text is likely to be written by AI

There is a 96% probability this text was entirely written by AI ⓘ

Sentences that are likely written by AI are highlighted.

A person using Generative AI needs to possess solid knowledge of the ethical and technical areas of such systems. Ethically they should be cognizant of the biases in the training data, the effects of generated output, and the need to ensure fairness and privacy. Technically they need to be knowledgeable of machine learning, data processing, model training, and fault-finding. Balancing these factors is very important because the work they do can impact both the digital and real-world. This helps ensure that artificial intelligence systems are efficient and novel and also responsible and mindful of societal conventions and citizen rights.

5/5 sentences are likely AI generated. ⓘ

---

Frustrated yet?

---

---

Me too. I played with that passage so much I decided to try to reproduce it by memory, in entirely my own words, trying my best to remember the major themes.

---



This text is likely to be written by AI

There is a **91%** probability this text was entirely written by AI ⓘ

Sentences that are likely written by AI are **highlighted**.

People using Generative AI should be aware of the ethical and technical issues that can arise due to their use. They should be knowledgeable about privacy and fairness, as well as have at least a basic understanding of how Generative AI works including how models are trained and the bias that can arise from the data these models are trained on. This is very important because users of Generative AI systems can have effects on the real world that are unintended and may cause harm.

**3/3** sentences are likely AI generated. ⓘ



---

Regardless, these are just numbers.

There is no smoking gun.

No artefact that was “copied” from.

So much for that, then.

---

---

# Tools



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# H1GPT – H1 STANDARD LEAVING CERT AI CHAT BOT

H1 GPT



I'm H1 GPT, how can I help?

Search ...

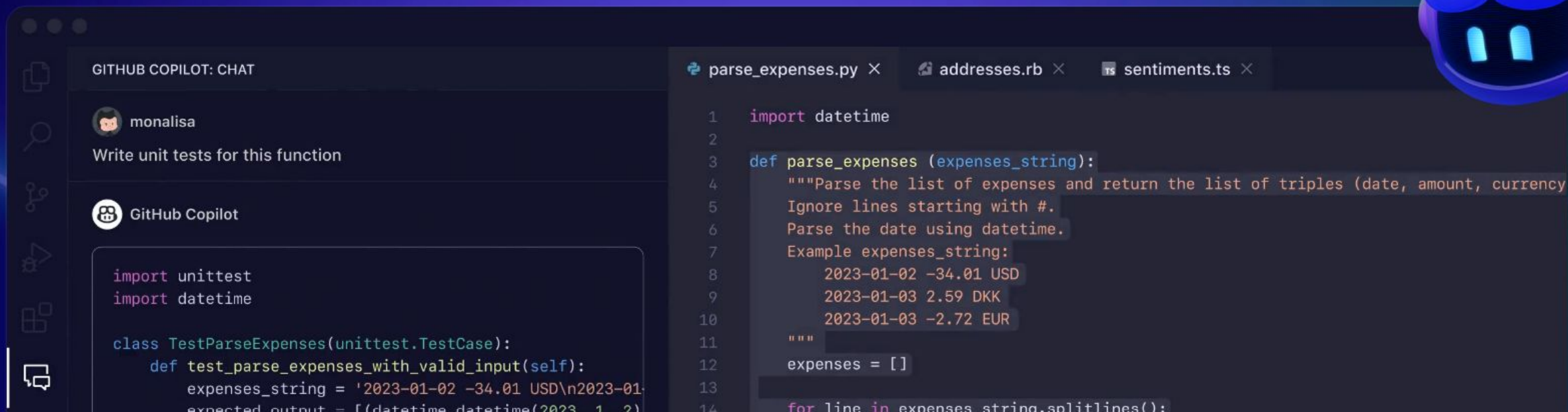


## RECENT POSTS

- » Advice for Students in T [Ask Us a Question](#) ➔
- » How to Prepare to Ace The Mocks
- » Advice on filling out the CAO

GitHub Copilot

# The world's most widely adopted AI developer tool.

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The screenshot displays the GitHub Copilot interface. On the left, a chat window titled "GITHUB COPILOT: CHAT" shows a conversation with the user "monalisa" who has asked to "Write unit tests for this function". The GitHub Copilot response is a Python code snippet for unit testing a function that parses expense strings.

```
import unittest
import datetime

class TestParseExpenses(unittest.TestCase):
    def test_parse_expenses_with_valid_input(self):
        expenses_string = '2023-01-02 -34.01 USD\n2023-01-03 2.59 DKK\n2023-01-03 -2.72 EUR'
        expected_output = [(datetime.datetime(2023, 1, 2), -34.01, 'USD'),
                           (datetime.datetime(2023, 1, 3), 2.59, 'DKK'),
                           (datetime.datetime(2023, 1, 3), -2.72, 'EUR')]
```

On the right, a code editor shows the implementation of the `parse_expenses` function in Python. The function takes an `expenses_string` and returns a list of tuples representing the date, amount, and currency for each expense line. The code includes comments and an example input string.

```
1 import datetime
2
3 def parse_expenses (expenses_string):
4     """Parse the list of expenses and return the list of triples (date, amount, currency)
5     Ignore lines starting with #.
6     Parse the date using datetime.
7     Example expenses_string:
8         2023-01-02 -34.01 USD
9         2023-01-03 2.59 DKK
10        2023-01-03 -2.72 EUR
11
12        """
13
14    expenses = []
15
16    for line in expenses_string.splitlines():
```



---

# Classroom practice & learning

---

---

# pair programming yesterday



# pAIr programming today

Terminal Help

Extension: AWS Toolkit matrix\_multiply.py

C: > Users > brett > temp > matrix\_multiply.py

```
1 |
```

A screenshot of a terminal window. The title bar says 'Terminal Help'. There are two tabs: 'Extension: AWS Toolkit' and 'matrix\_multiply.py'. The terminal shows the current directory path 'C: > Users > brett > temp >' followed by the file name 'matrix\_multiply.py'. The first line of the file contains the number '1' followed by a vertical cursor bar.

me & my AI

---

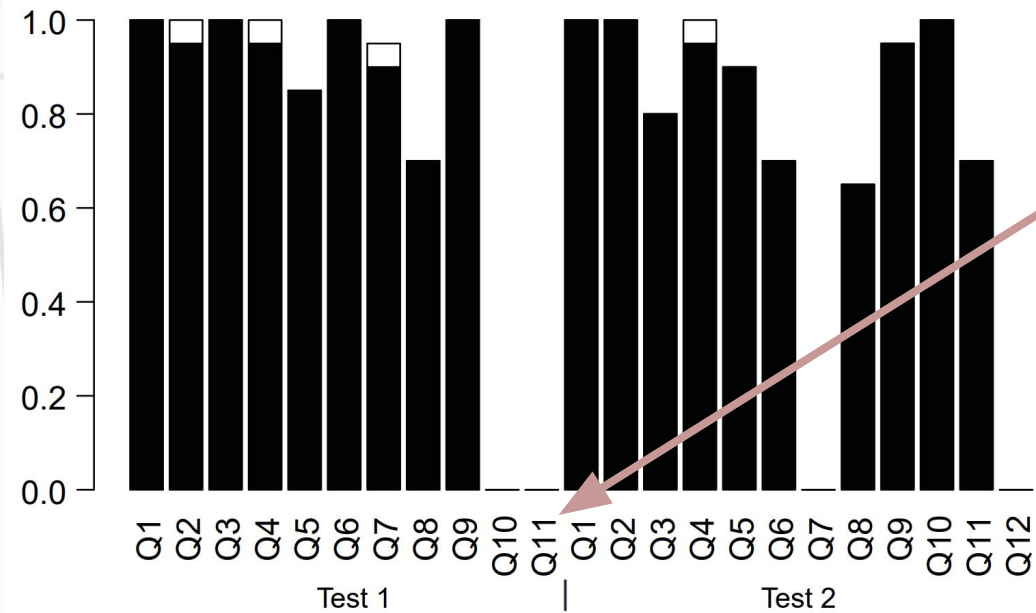
---

**(Constantly improving) Capabilities**

---

# You can practically watch the capabilities improve

## Codex, 2021



Based on GPT-3, additional training layer (of computer programs)

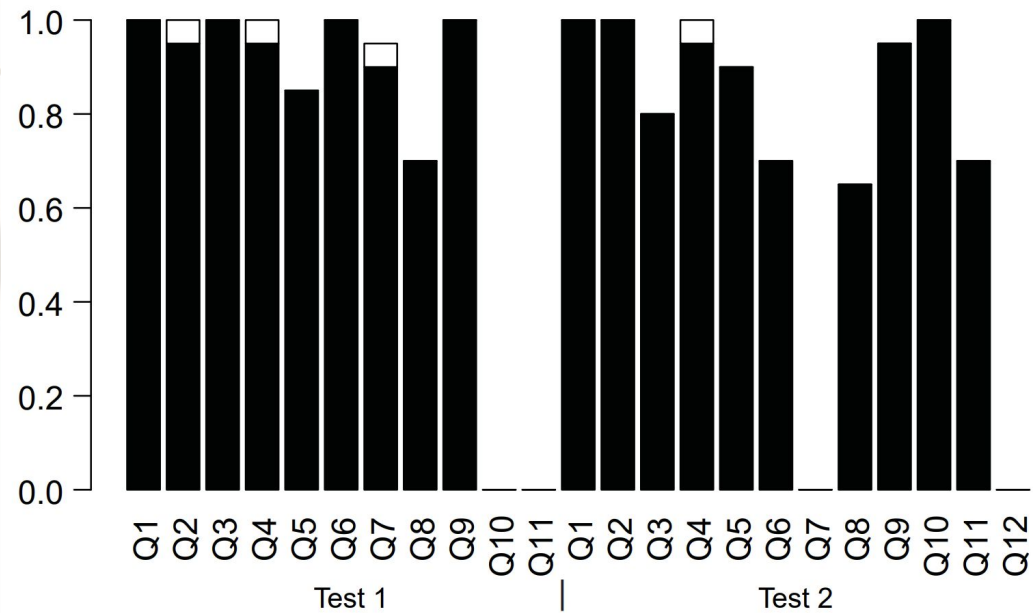
Real questions from two University of Auckland year 1 programming exams

Codex was in the 76<sup>th</sup> percentile of ~100 real university students

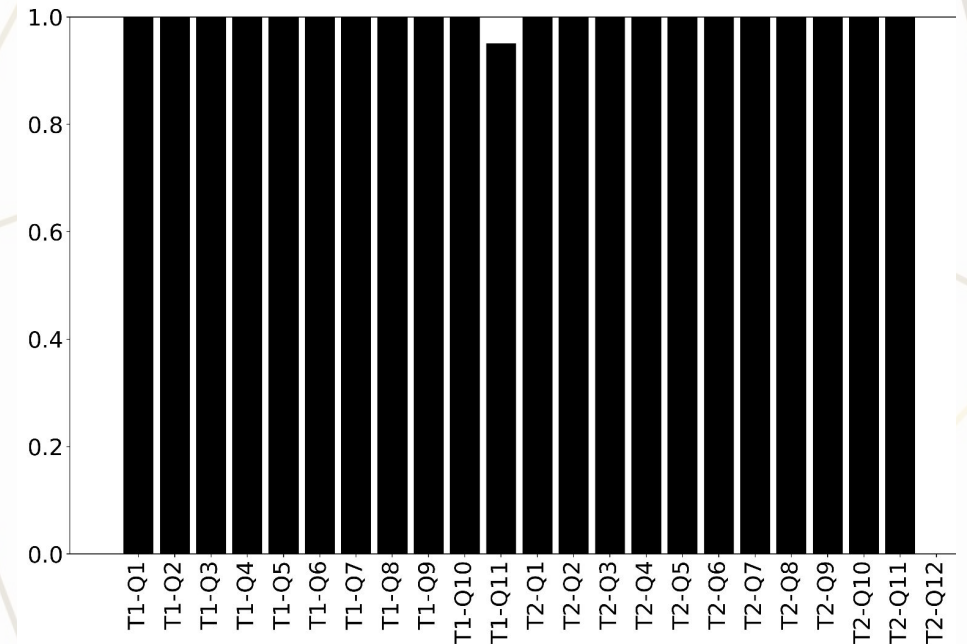


# You can practically watch the capabilities improve

## Codex, 2021



## GPT-4, this summer



In essence, 100% - top of the class

---

# What do I do with the top 25% of the class?

- Ask them to be Teaching Assistants!
  - What does a Generative-AI powered TA look like? Perhaps a software/app-based personalised learning tutor.
  - Capable Large Language Models are the key ingredient for this
    - Never sleep
    - Never get annoyed at being asked the same question over and over again
    - Basically free
    - Infinitely scalable
  - How would this change education? Classroom practice?
  - What would this mean for assessment?
-

---

What will this mean for the future  
of teaching and learning?

---

Way back in 1984....

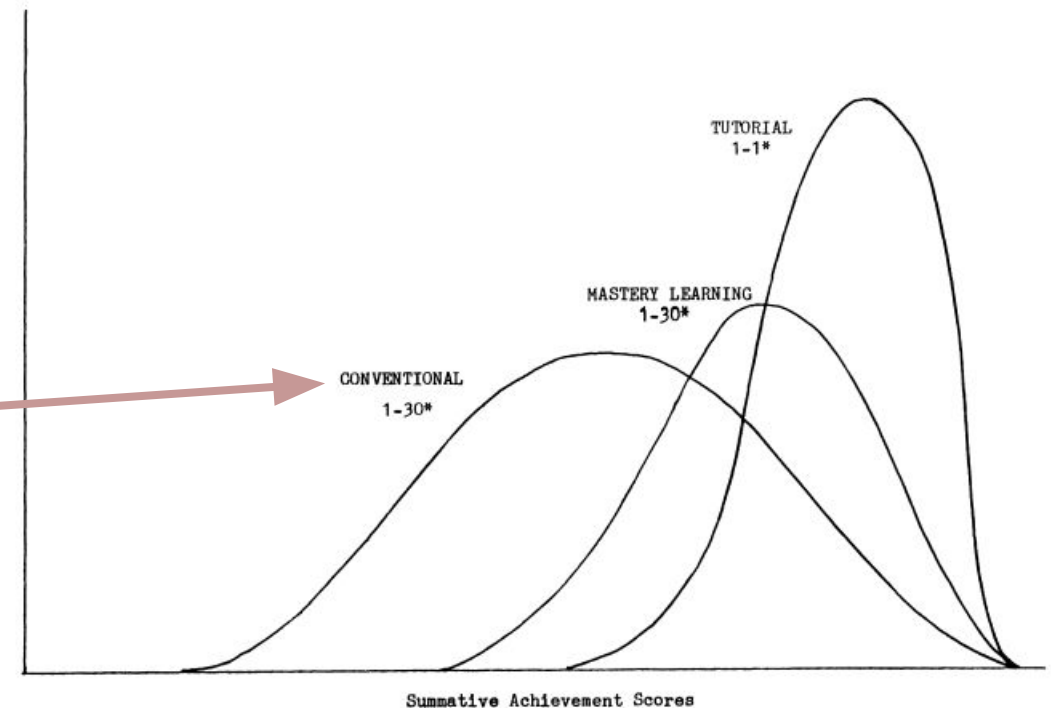
## The 2 Sigma Problem: The Search for Methods of Group Instruction as Effective as One-to-One Tutoring

BENJAMIN S. BLOOM  
*University of Chicago and Northwestern University*

**Conventional.** Students learn the subject matter in a class with about 30 students per teacher. **Tests are given periodically for marking the students.**

Normal “bell” curve

FIGURE 1. Achievement distribution for students under conventional, mastery learning, and tutorial instruction.



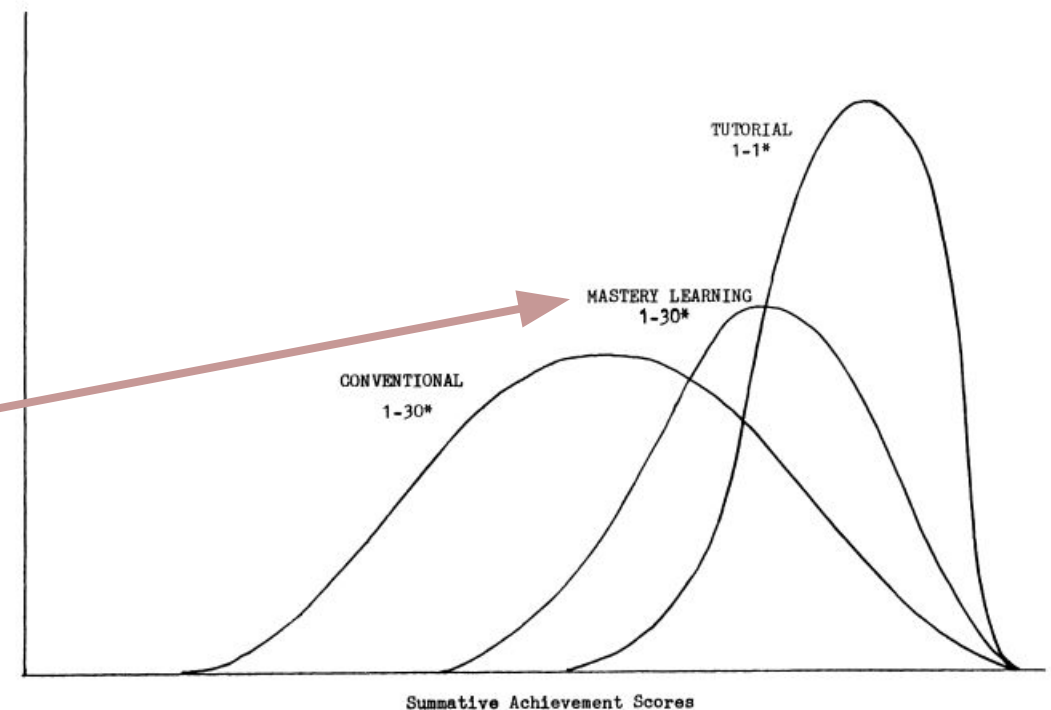


## Way back in 1984....

**Mastery Learning.** Students learn the subject matter in a class with about 30 students per teacher. The instruction is the same as in the conventional class (usually with the same teacher). **Formative tests (the same tests used with the conventional group) are given for feedback followed by corrective procedures and parallel formative tests to determine the extent to which the students have mastered the subject matter.**

Significant skew upwards in grades

**FIGURE 1.** Achievement distribution for students under conventional, mastery learning, and tutorial instruction.



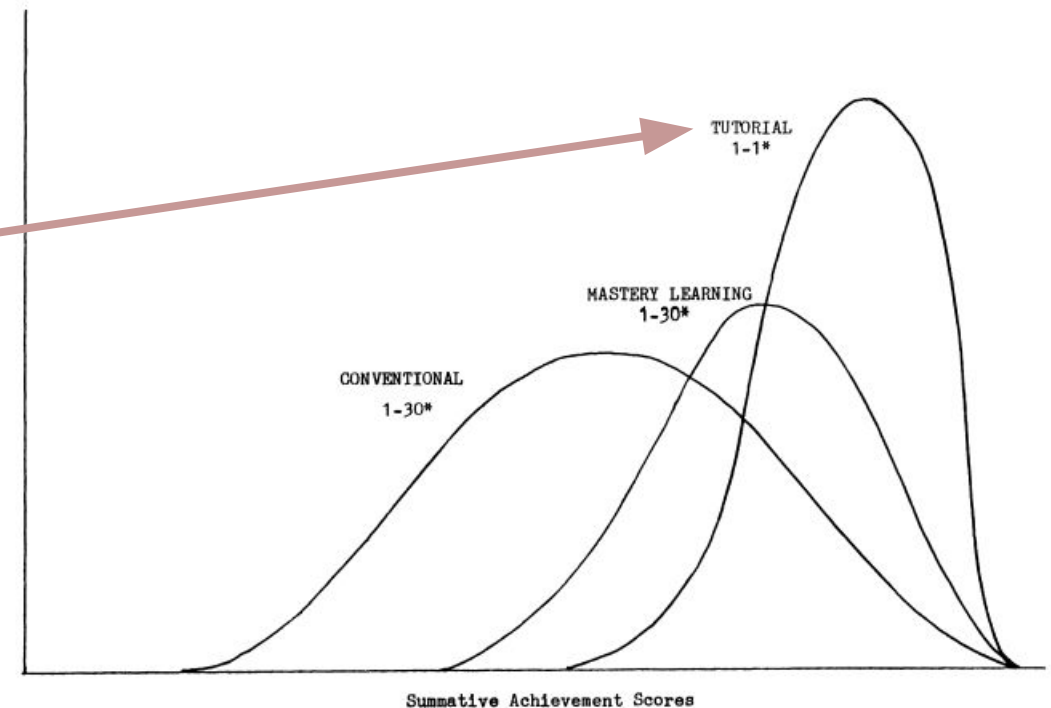
Way back in 1984....

**Tutoring. Students learn the subject matter with a good tutor for each student (or for two or three students simultaneously). This tutoring instruction is followed periodically by formative tests, feed-back-corrective procedures, and parallel formative tests as in the mastery learning classes.**

Mean is now two standard deviations (2 sigma) above conventional practice

**“The average tutored student was above 98% of the students in the control class”**

**FIGURE 1.** Achievement distribution for students under conventional, mastery learning, and tutorial instruction.



## Way back in 1984....

---

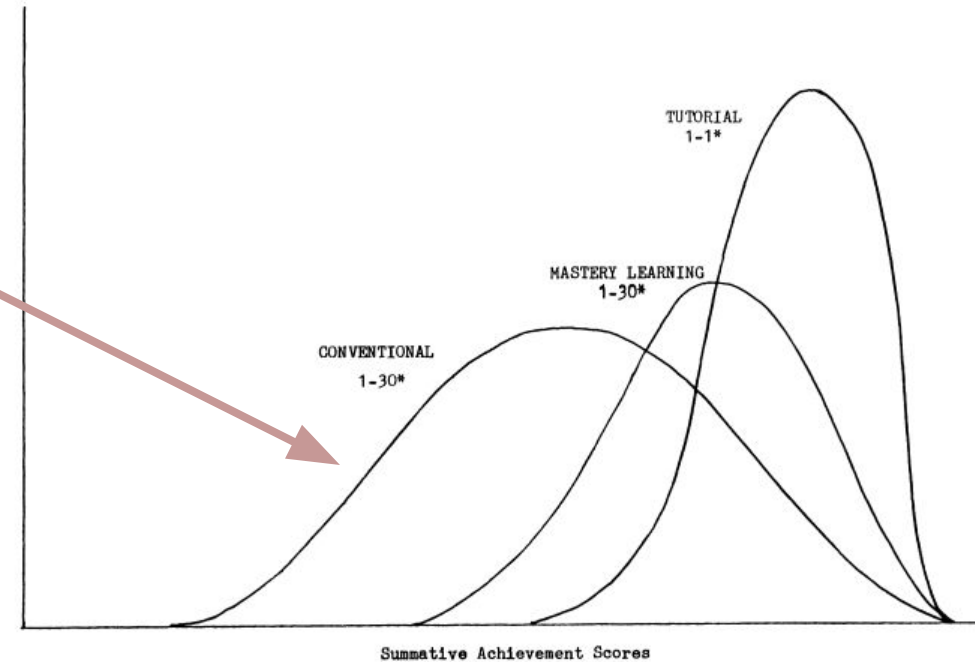
“The tutoring process demonstrates that most of the students do have the potential to reach this high level of learning. I believe an important task of research and instruction is to seek ways of accomplishing this under more practical and realistic conditions than the one-to-one tutoring, which is too costly for most societies to bear on a large scale. **This is the "2 sigma" problem.**”

---

# Could Generative AI solve the 2-sigma problem?

- Almost all students (on today's assessments) could be getting A grades
- What does that mean for assessment?
  - Make it harder?
    - Then we'd be back to this again
    - Is that what we want?

FIGURE 1. Achievement distribution for students under conventional, mastery learning, and tutorial instruction.





---

# Assessment



---

---

# Assessment is going to be the key – and the challenge

- Teachers are ~~going to use~~ already using Generative AI
  - Students are ~~going to use~~ already using Generative AI
  - This will become normal
    - Virtual, personal learning tutors
    - Tools (Microsoft Word, GitHub Copilot, Design Studios, etc.) are going to become normal and very capable
  - All types of assessment
    - Formative – classroom practices, etc. The very way that teaching and learning happen
    - Summative – Invigilated? Paper-based? Harder than today? More nuanced than today?
-

---

# Assessment is going to be the key – and the challenge

- In too many cases today, assessment is broken.
  - It is too often based on a **product**, not the process of creating, developing, and arriving at the product.
-

---

# Assessment is going to be the key – and the challenge

- Let's go way into the future.
  - Time travels fast with Generative AI.
  - Let's play it safe – 10 years – 2033.
  - How much have assessments changed since 2013? Not Much!
  - Will grades as we know them today even exist?
    - Will they be based on improvement, not each learner being benchmarked on the same bar?
    - Will they be based on creativity? Nuance? Depth?
    - Will they be based on ability to communicate knowledge? Integrate? Assimilate?
    - Will they be based on putting knowledge into practice?
-



---

# Assessment is going to be the key – and the challenge

How will Generative AI change the way we assess our students?

That is up to us (to figure out).

Don't forget, when you change assessment, learning goals change. Practice changes. Assessment changes...

---

# AI, Education & You: Part 3: Examine ChatGPT



# Examine ChatGPT

Let's put ChatGPT to the test:

1. Organise into groups (1 laptop per group)
2. Login into ChatGPT at <https://chat.openai.com/>
3. Enter a selection of the questions from the following slides into ChatGPT and examine its answers
4. Experiment with exam style questions of your own and consider the ability of ChatGPT to answer them
5. Paste answers (generated or your own) into "Brett's document" to run past the AI detector

# Examine ChatGPT

## 2022 LC Higher Level History

How did Lemass and Whitaker strengthen the economy and/or seek to improve relations with Northern Ireland?

## 2022 LC Foundation Level Maths

Manuela plays another game with a pile of 48 cards.

40 of these cards are grey, and 8 are white.

Manuela picks 4 cards at random from the pile, without replacement.

3 of her cards are grey, and 1 is white.

Manuela is going to pick one more card at random from the remaining cards in the pile.

Find the probability that this last card will be grey.



# Examine ChatGPT

## 2022 JC Ordinary Level Irish

Léigh an fógra seo.

### FÓGRA

Buail le Sam Bennett

Siopa Rothar Uí Cheallaigh,

Carraig na Siúire, Co. Thiobraid Árainn.

Déardaoin, 30 Meitheamh 2022

Beidh an rothaí cáiliúil sa siopa idir 3.00 p.m. agus 5.00 p.m.

Cead isteach saor in aisce

Bígí ann!

Scríobh teachtaireacht chuig cara leat ag insint dó/di faoi chuairt Sam Bennett ar an siopa. Tabhair cuireadh dó/di teacht leat chun bualadh leis.

# Questions?

Thank you

Brian Mac Namee

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Brett Becker

[brett.becker@ucd.ie](mailto:brett.becker@ucd.ie)