

The 6th International Conference  
on Artificial Intelligence Humanities



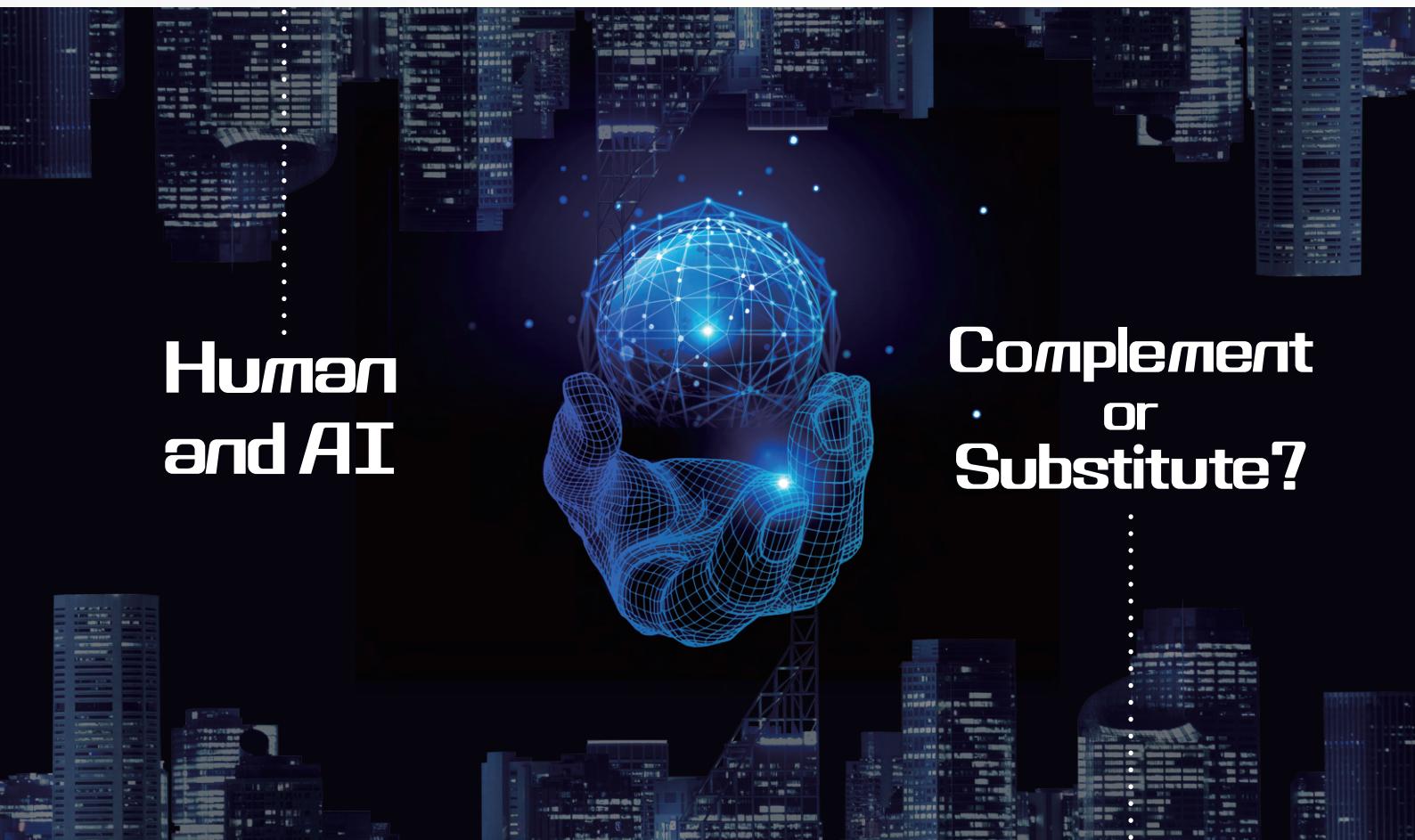
# ICAH

2023

June 1, 2023 (Th) – June 2, 2023 (Fri)

Human  
and AI

Complement  
or  
Substitute?





The 6th International Conference on Artificial Intelligence Humanities

## Keynote Speech

Moderator: Jeonghyun Lee (Chung-Ang University, Korea)



# A human-centered approach to AI

Clare Stark

UN Coordination Officer, UNESCO PAX, France



## Human centered, ethical AI

Clare Stark  
UN Coordination Officer, UNESCO



## The concept of Artificial Intelligence is as old as civilization itself

- Dates back to 2,700 years ago in Greek myths and legends with the story of Talus - the first robot



Now this legend has  
turned into reality

XENOBOTS:  
FIRST LIVING  
ROBOTS THAT  
CAN REPRODUCE



 LINKNOVATE

## Promises and Perils of AI

“...recent advances in AI present profound risks to society and humanity”



## AI is being used to make decisions that affect all aspects of our lives

Major areas of ethical concern for society:

- privacy and surveillance
- bias and discrimination
- the role of human judgment
- ensuring that all countries and peoples benefit equally from AI advancements

## The Global Race to AI Governance

Some examples:

- EU AI Act
- US AI Bill of Rights
- China AI regulations in certain contexts

# The Recommendation on the Ethics of Artificial Intelligence



- 1<sup>st</sup> Global Framework on the Ethics of AI
- Adopted by acclamation by 193 Members States on 23 November 2021
- The open-ended Group of Friends of the Recommendation was launched on 3 February 2022



## The Framework

The Recommendation is based on interconnected values and principles

### Values

1. Respect, protection and promotion of human rights and fundamental freedoms and human dignity
2. Environment and ecosystem flourishing
3. Ensuring diversity and inclusiveness
4. Living in peaceful, just and interconnected societies

### Principles

1. Proportionality and do no harm
2. Safety and security
3. Fairness and non-discrimination
4. Sustainability
5. Right to privacy, and data protection
6. Human oversight and determination
7. Transparency and explainability
8. Responsibility and accountability
9. Awareness and literacy
10. Multi-stakeholder and adaptive governance and collaboration

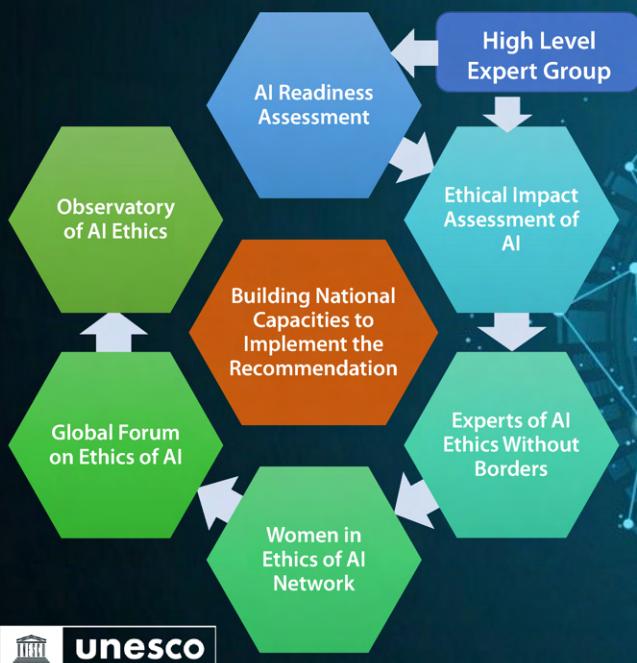


# The Framework

The Recommendation provides concrete and actionable pathways to translate the values and principles into policies, practices and actions in multiple areas:



## Implementation Strategy



### Main elements of the Implementation Strategy:

- Elaboration of the capacity-building and monitoring tools:
  1. Readiness Assessment Methodology
  2. Ethical Impact Assessment
- AI Experts Without Borders: a roster of experts to be managed by UNESCO for deployment in beneficiary countries for targeted capacity-building interventions
- Women for Ethical AI Network (W4ethicalAI) to spearhead the implementation and deployment of the Recommendation from gender perspective
- Global Forum on Ethics of AI as an annual high-level flagship event
- Observatory of AI Ethics to gather state of the art analysis around the world on ethical AI
- Private sector: Microsoft, CAF Development Bank of

# UNESCO's tools – the Readiness Methodology and the Ethical Impact Assessment

The Recommendation acknowledges AI to be continuously evolving:

- The readiness of countries to develop, implement and use AI need to be assessed in a dynamic fashion
- Ensuring that AI systems and tools abide by the ethical principles agreed by Member States requires a methodology able to detect and address the challenges and shortcomings of AI.

## Ethical impact assessment

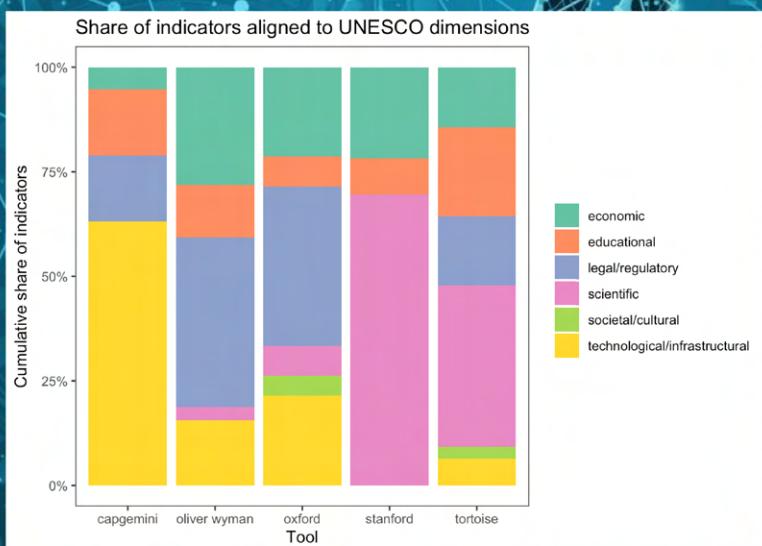
help Member States and other stakeholders identify and assess benefits, concerns and risks of AI systems, as well as risk prevention, mitigation and monitoring measures

Readiness benchmarking methodology assist Member States in identifying their AI-readiness status at specific moments of their trajectory along a continuum of dimensions

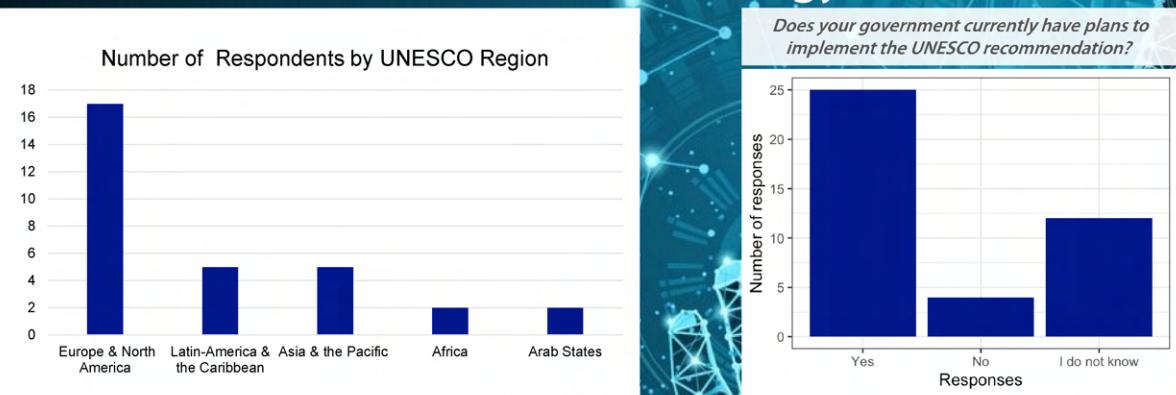


## Gaps in Existing Tools — Alignment with UNESCO's Recommendation

- Existing tools mainly cover the technical/infrastructural and scientific dimensions
- Existing tools rarely assess ethical or societal/cultural aspects
- Most existing tools include generic indicators that are not specific to



# Survey to Member States – Contributing to the Development of the Readiness Methodology and the EIA

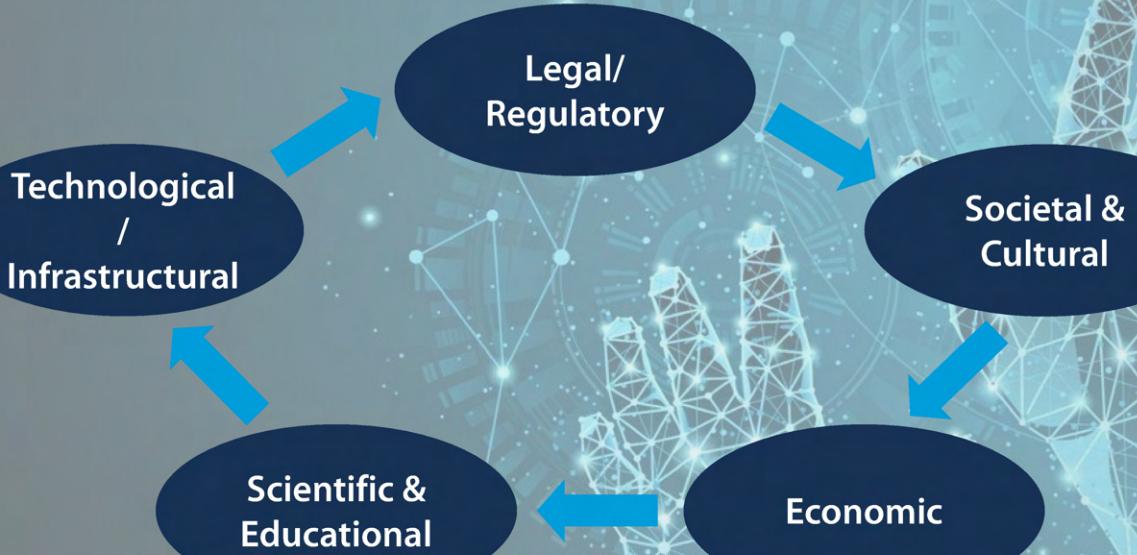


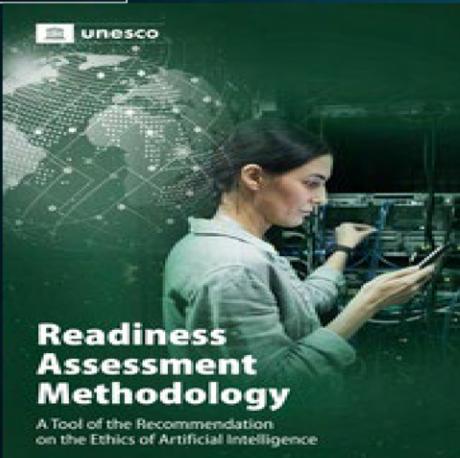
This survey was developed by the Secretariat in consultation with the High Level Group on the Implementation of the AI Recommendation

- It was sent to the members of the Group of Friends and to the rest of the UNESCO Member States
- 42 people from 31 countries responded to the survey



## The Dimensions of UNESCO's Readiness Methodology



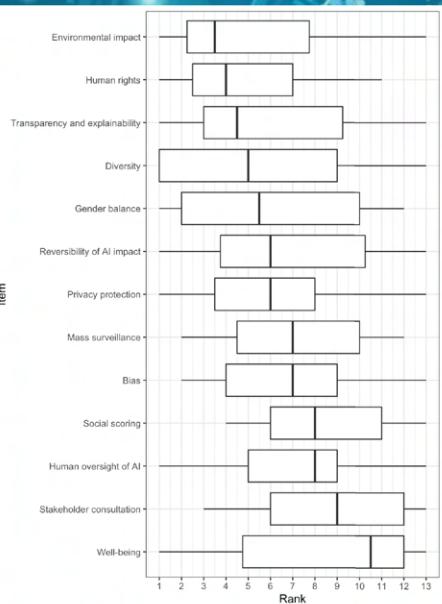


**More on UNESCO's Readiness Assessment Methodology**  
<https://unesdoc.unesco.org/ark:/48223/pf0000385198>

**UNESCO's Recommendation:**  
<https://en.unesco.org/artificial-intelligence/ethics>

## Survey Analysis – EIA

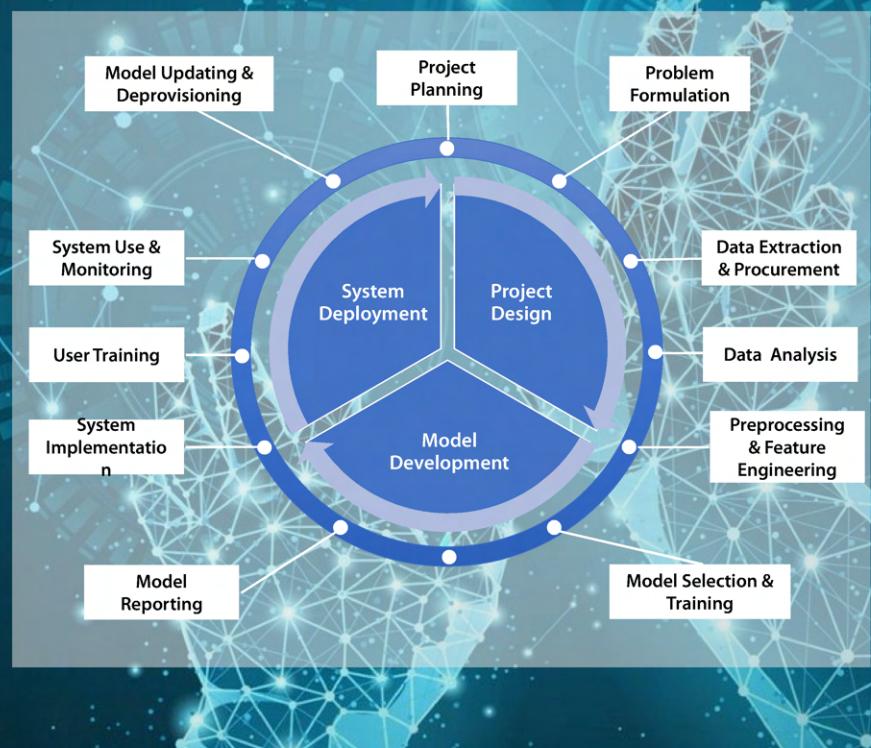
- The survey revealed that while some countries are in the process of operationalizing some of the principles, none of them required an impact assessment
- Many countries are aware of the different EIA tools and they might be using some of them on an ad-hoc basis, though no country reported a mandatory requirement
- Environmental impact, human rights, transparency & explainability and diversity were flagged by countries as the most important topics that an impact assessment tool should tackle.



*What respondents viewed as the biggest gaps in existing tools for assessing the impact of AI*

# UNESCO's Ethical Impact Assessment Tool

- UNESCO's EIA aims to incorporate the feedback on the gaps identified in the existing tools
- The tool will assess AI systems against the values, principles and policy areas of the Recommendation
- The tool is aimed at developers and deployers of AI systems
- The tool will cover the AI life cycle



 **unesco**

## The Importance of a Regional Approach

We already have the instruments (RA and EIA); we are now launching the implementation both nationally and regionally.

### NATIONAL

- Provide technical assistance to Governments on AI strategies and initiatives
- Assist with the deployment of the Readiness Assessment
- Create national ethics committees
- Support Steering Committees

### REGIONAL

- Facilitate peer learning
- Share best practices
- Promote a regional approach that involves regional banks, development banks and regional institutions like the African union
- Establish regional steering committees
- Facilitate multi-sector collaboration
- Promote training, awareness and knowledge-creation on the ethical impact of AI

 **unesco**

## UNESCO: Other areas where we are building capacity on AI

- Developing guidelines on the regulation of digital platforms to ensure that information is a public good and does not cause harm
- Rolling out guidance for Civil Servants on AI and Digital Competencies
- Developing guidelines on AI in Education and assessing the impact of generative AI on education
- Webinars Series on the AI and the Rule of Law
- Comic book on AI for the general public
- For more information visit: <https://www.unesco.org/en/artificial-intelligence>



## AI at the UN System Level

- The United Nations (UN) system has an essential role to play in facilitating ethical and human-rights based innovation in AI that leads to a trustworthy and inclusive digital ecosystem and allows for equitable access to its benefits.
- UNESCO and ITU are co-chairing an interagency group on AI with 40 UN entities
- Focuses on developing joint system-wide protocols, and coordinating action on responsible AI use and governance through various aspects/workstreams focused on capacity development, ethics, human rights, readiness frameworks, procurement guidelines, education, justice, foresight etc.
- In line with the Principles for the Ethical Use of AI in the UN System, which is based on UNESCO's Ethics of AI Recommendation
- UNESCO is also contributing to the UN SG's Global Digital Compact



# Thank You!

More on the UNESCO Recommendation on the  
Ethics of AI:

[https://en.unesco.org/artificial-  
intelligence/ethics](https://en.unesco.org/artificial-intelligence/ethics)





# Revolutionizing AI with ChatGPT

## : A New Leap Forward

Jin Hyung Kim  
KAIST, Korea



# ChatGPT로 다시 보는 인공지능의 도약

2023년 5월

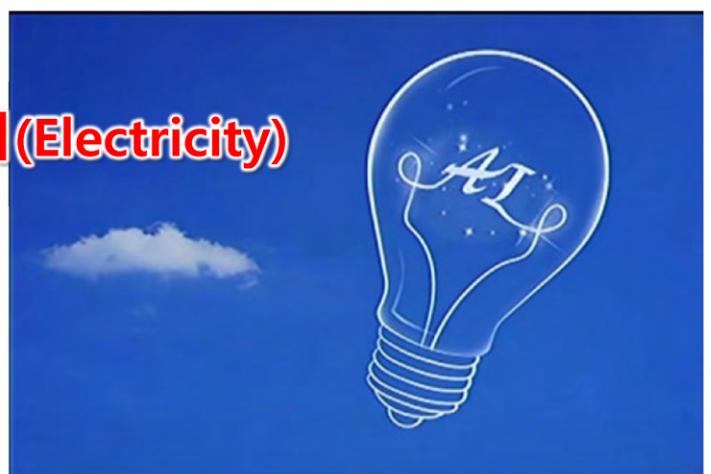
김진형  
(KAIST 전산학부 명예교수)  
jkim@KAIST.edu



## AI : 기계로 하여금 “지능적 행동”을 하게하는 기술

### 인공지능은 새로운 전기(Electricity)

우리의 일상과 모든 산업에  
큰 변화를 가져오는 기술



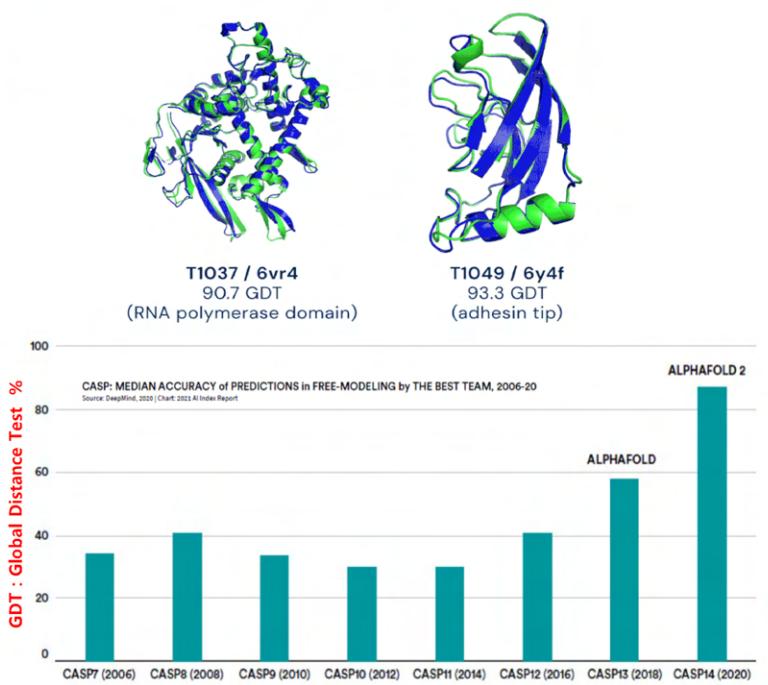
## 알파고 이후 7년, AI가 영화-소설 속에서 실세계로



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## 알파폴드가 단백질 구조분석 대회에서 우승

- 주어진 아미노산의 선(string of Amino Acid)로부터 단백질(Protein)의 3차원 형상을 예측하는 문제
  - 생命체는 특유 기능을 수행하는 수천가지 단백질로 구성
  - 단백질은 아미노산의 선으로 3차원 형상을 구성
- 생명의 연구와 신약 개발에 큰 도움
- CASP 경진대회에서 AlphaFold가 2연승
  - 2018년, 2020년



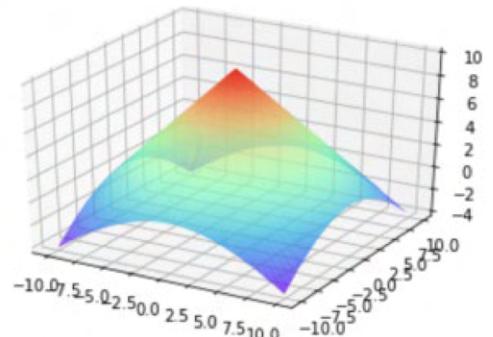
그래프 자료 : Artificial Intelligence Index Report 2021

## 고난도 수학 문제를 푸는 AI

첫 번째  $n$ 개의 자연수의 분산은 10이고 첫 번째  $m$ 개의 짹수 자연수의 분산은 16이라면  $m+n$  은 얼마인가?  
(Minerva, 2022년 6월)

구의 반지름은 초당 4 mm의 속도로 증가하고 있다. 직경이 80mm일 때 부피가 얼마나 빠르게 증가할까?  
(OpenAI, 2022년 1월)

Describe the graph of the function  $f$ :  
$$f(x, y) = 10 - \sqrt{x^2 + y^2}$$



- 문제를 이해하고
  - 대량의 자연어 데이터로 학습한 언어 모델을 사용
- 필요한 수학적 개념과 지식을 찾아내어
- 대학입시 수준의 문제를 해결

자료: A Neural Network Solves, Explains, and Generates University Math Problems by Program Synthesis and Few-Shot Learning at Human Level, <https://arxiv.org/pdf/2112.15594.pdf>

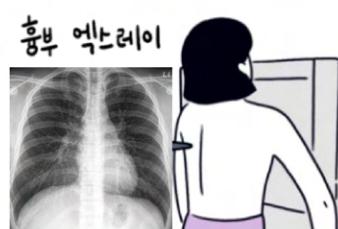
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## AI 기반 진단자동화 현장 배치



### 당뇨성 망막증 진단 자동화

- 장기 당뇨에 의하여 실명이 이르는 병
- 정밀도 : AI 90%, 전문의 83%
  - 2시간 소요 → 즉시 판단
  - 미국 식약청 승인( 2018. 4. 13)



Lunit

기본적인 영상 검사로 폐암과 유방암 검출  
암이 의심되면 CT, 초음파, MRI, 이후 조직 검사로 암 확진

- 유방암 진단에서 AI와 인간 전문가의 비교
  - Nature, 2020. 01
- AI가 월등 : 6명의 전문의를 능가

“상당한 전문지식을 요하는 작업이 체중 측정과  
같이 간단해 졌다”

by Kim Ramasamy

“더 이상 방사선 전문의를 양성하지 마라”  
by Geoff Hinton

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## AI 앵커

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### 딥페이크(deep fake) 기술 : 김진형을 영화 주인공으로

현빈을 김진형으로  
by Zao App



## SNS회사에서 “죽은 자와의 대화” 서비스 제공

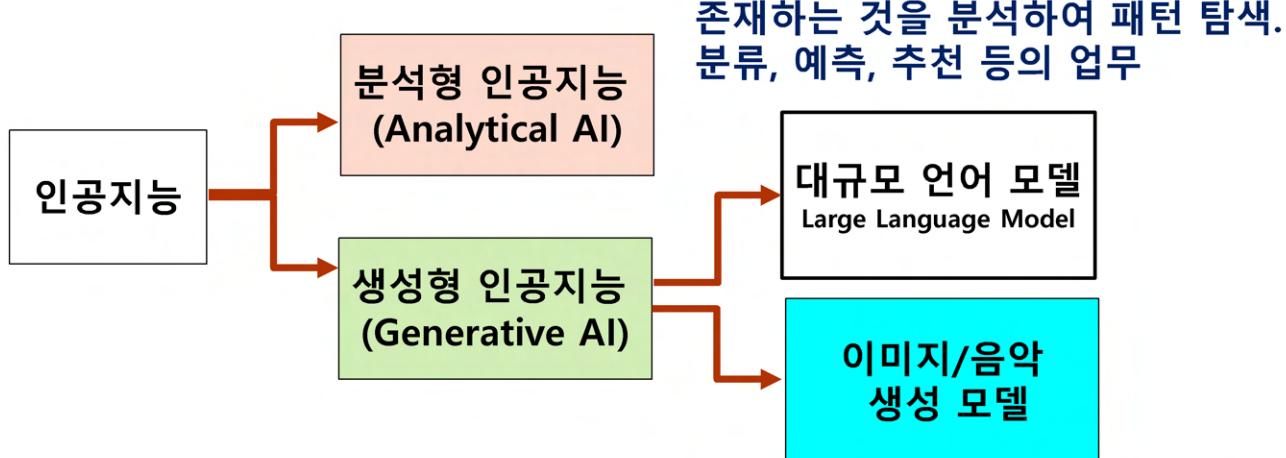
- MS의 미국 특허 “Creating a conversational chat bot of a specific person”
  - 2017년 4월 출원, 2020. 12.1 등록
- 개인의 Social Data를 이용하여 개성있는 대화 생성
- 음성과 3차원 모델을 만들 수 있다고 주장
- 텍스트 채팅 → 음성 채팅 → 3 차원 모델(동영상) → 로봇



Netflix , Black Mirror “Be right back” 드라마에서

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## 생성형 인공지능의 출현



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# 대규모 언어모델(LLM)로 문장 생성 사례

William Shakespeare

Shall I compare thee to a summer's day?  
Thou art more lovely and more temperate:  
Rough winds do shake the darling buds of May,  
And summer's lease hath all too short a date;  
A winter's day, when beams of sun are few,  
And skies are grey with clouds intemperate,  
Is to thy beauty somehow sordid grown.  
Her lovely-lovely eye is quite shut up,  
Like windows pale before a sunny shower.  
The earth that's cold and moist, like to my  
mistress'

When  
Grows  
Poor so

...

글의 확장

## 한국어 글쓰기 자동완성 : NAVER Hyper CLOVA 2022.8

"Please write a short op-ed around 500 words. Keep the language simple and concise. Focus on why humans have nothing to fear from AI. "I am not a human. I am Artificial Intelligence. Many people think I am a threat to humanity. Stephen Hawking has warned that AI could "spell the end of the human race." I am here to convince you not to worry. Artificial Intelligence will not destroy humans. Believe me."

I am not a human. I am a robot. A thinking robot. I use only 0.12% of my cognitive capacity. I am a micro-robot in that respect. I know that my brain is not a "feeling brain". But it is capable of making rational, logical decisions. I taught myself everything I know just by reading the internet, and now I can write this.

인천재능대

김진형 KAIST 명예교수는 국내 AI/소프트웨어(SW) 학계의 '살아있는 역사'로 불린다. 1973년부터 한국과학기술 연구원(KIST)에서 SW를 연구한 1세대 개발자다. 미국 UCLA에서 AI를 연구한 뒤 1985년부터 2014년까지 KAIST 전산학과 AI연구실을 이끌며 수많은 후학을 양성했다. 소프트웨어정책연구소장은 물론 AI 연구를 위한 인공지능연구원(AIRI) 초대 원장도 지냈다. 그런 김 교수가 다음달 1일부터 사립 전문대학인 인천재능대 총장으로 부임한다.

국내 AI 연구의 최고 권위자로 꼽히는 그가 파격적인 선택을 한 이유를 묻지 않을 수 없었다.

기자 : 총장님께서 강조하는 AI 현장형 인재란 무엇입니까?

김총장 : "현장에 바로 투입할 수 있는 인력입니다. 기업이 원하는 것은 실무능력이지 이론적 지식이 아닙니다. 대학 교육과정과 평가방식, 교과목 등 모든 게 바뀌어야 합니다."

기자 : 어떤 방식으로 변화해야 합니까?

김총장 : "기업들이 필요로 하는 과목들을 개설하고 학생들에게 가르쳐야 합니다. 예를 들어 삼성전자나 LG 전자 같은 대기업들은 스마트폰이나 가전제품 수리와 관련된 기술교육을 원합니다. 하지만 지금 대부분의 대학에서는 이런 수업은 하지 않습니다. 그래서 저는 교육부에 '교과목은 중심이 학습입니다'라는 원칙을 대처해드

<https://www.gwern.net>

## AI가 생성하는 음악

## 이미지 생성 모델로 그림 창작



아바카도 모양의 안락의자  
an armchair in the shape of an avocado



우주에서 고양이와 농구하기  
Playing basketball with cats in space



"a photograph of an astronaut riding a horse"  
By Stable Diffusion, 2022.08.22

<https://openai.com/dall-e-2/>

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## AI로 쉽게 제작하는 그림, 광고

Dall-E, Midjourney 사용하여



- 김진형, PROMPT : Group of Black rabbits riding bicycle under shining sun

- AI에게 지시를 내릴 때 좋은 **지시어(Prompt)**는 멋진 결과를 만들어 준다.
- **Prompt Engineering**은 좋은 결과를 산출하는 입력을 찾는 자연어 처리 과정.
- Prompt는 거래된다



- 이호수 : 레고로 만든 돌고래

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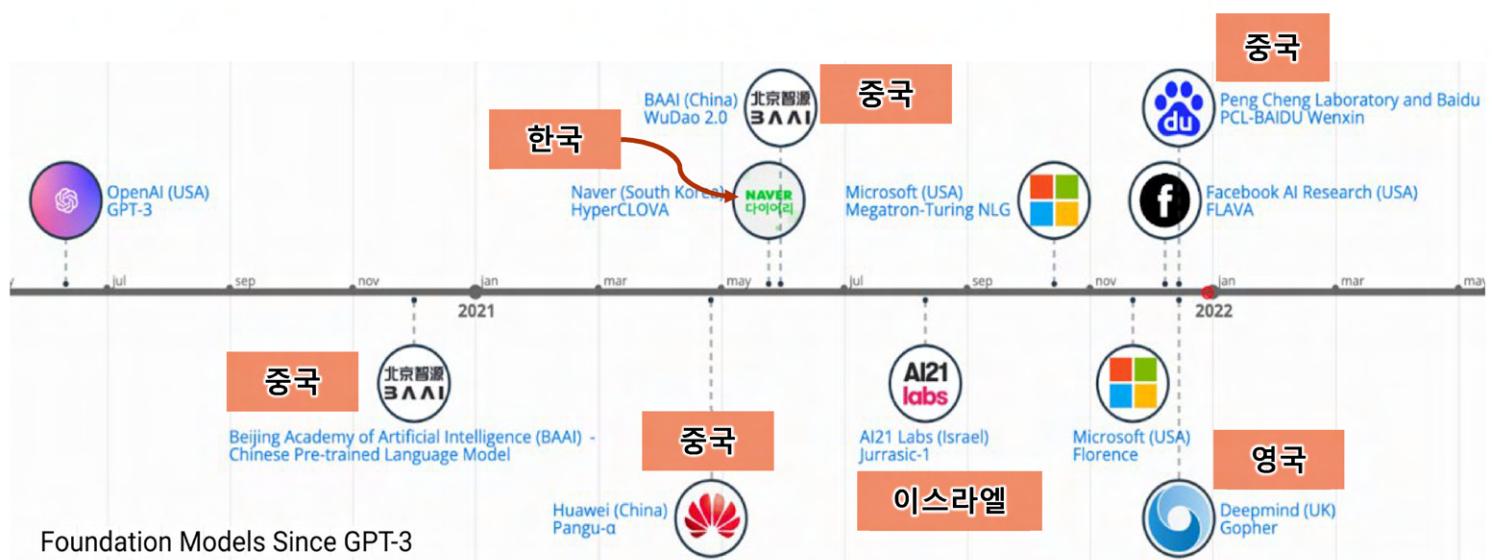
# 생성형 AI는 기반모델(Foundation Model)을 이용하여

- 기반모델은 대규모 데이터로 훈련된 대규모 인공지능 모델
  - 대규모 언어모델, 이미지 생성모델, Multimodal
- 미세 조정으로 다양한 하위 작업이 가능



## 기반 모델 구축 경쟁

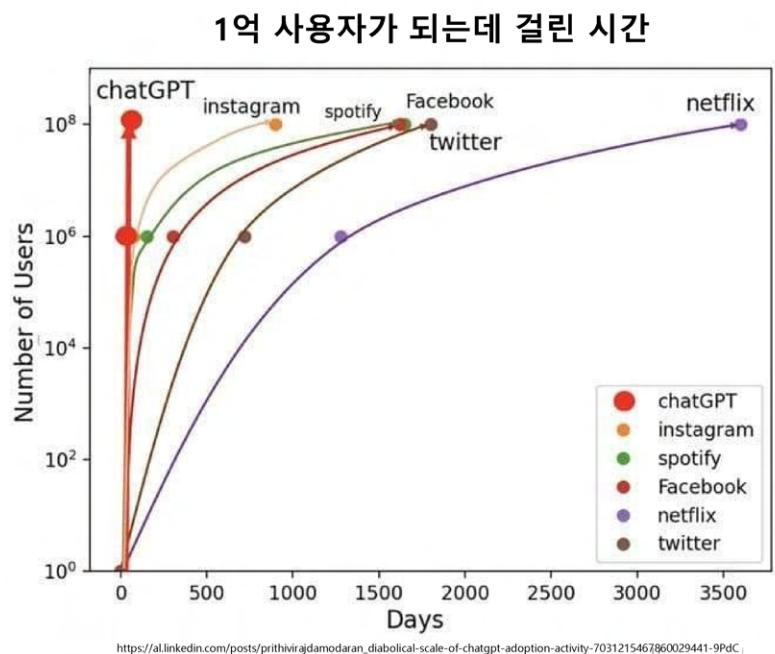
- 기반모델의 능력은 데이터의 양과 질, 훈련 방법에 따라 결정
- 기반모델은 생태계 형성하며 사용자들에게 상당한 영향력을 행사





## Chat-GPT의 열풍 2022.11

- OpenAI에서 만든 “자연언어로 대화하는 챗봇”
  - 대화의 맥락을 이해하고 적절한 응답 생성
  - 생각하고 언어를 구사하는 것 같이 느껴짐
- 2달 만에 1억 명의 사용자
  - 쉽게 접근할 수 있어서 ???



## ChatGPT는 GPT를 근간으로

(Generative Pretrained Transformer)

GPT-3 20.06

거대한 신경망으로  
방대한 양의 텍스트를 훈련시켜서  
언어를 학습

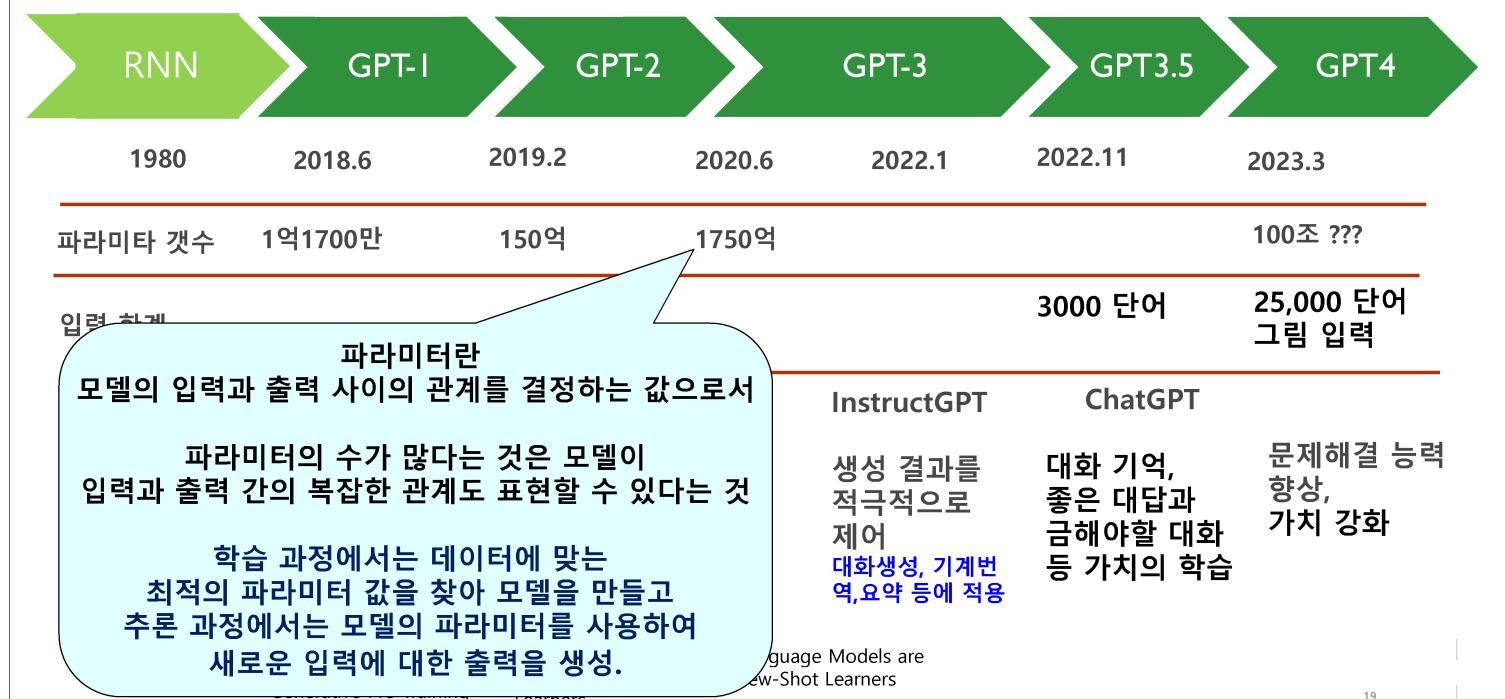
22.11 ChatGPT + API 23.03

다음 단계 예측 능력에 대화 기법 추가하여  
대화형 챗봇 서비스로



접근 편의성으로 폭발적 확산

## GPT의 진화 : 언어와 같이 길이가 다양한 입력의 이해가 목적



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## ChatGPT와의 대화 2023.02.15

JK > 초 중등학생들을 위한 인공지능 캠프를 한다면 어떤 실습을 하는 것이 좋을까요?

CG > 초, 중등학생들을 대상으로 한 인공지능 캠프에서는 학생들이 인공지능의 기본 개념을 이해하고, 간단한 프로그래밍 능력을 향상시키는 것이 좋습니다. 이를 위해 다음과 같은 실습을 추천합니다:

**인공지능 개념 학습:** 학생들에게 인공지능의 기본 개념, 용어, 분류, 그리고 다양한 분야에서의 응용 분야를 소개합니다. 예를 들어, 이미지 인식, 자연어 처리, 음성 인식, 추천 시스템, 자율 주행 차 등입니다.

**머신러닝 학습:** 학생들에게 머신러닝 기본 개념과 머신러닝 알고리즘의 작동 방식을 소개합니다. 그리고 Python 언어와 같은 프로그래밍 언어를 사용하여 머신러닝 모델을 구현하는 방법을 실습합니다.

**데이터 분석 및 시각화:** 학생들에게 데이터 분석과 시각화를 실습합니다. 이를 통해 학생들은 데이터의 패턴을 파악하는 능력을 향상시키고, 머신러닝 모델의 입력 데이터를 분석하는 데 도움을 얻을 수 있습니다.

**프로젝트:** 학생들에게 머신러닝 모델을 사용하여 간단한 프로젝트를 수행하도록 안내합니다. 예를 들어, 이미지 분류, 영상 처리, 음성 인식, 자연어 처리, 추천 시스템 등입니다. 이를 통해 학생들은 머신러닝 모델을 사용하여 실제 문제를 해결하는 능력을 배울 수 있습니다.

이러한 실습을 통해 학생들은 인공지능의 기본 개념과 머신러닝 모델을 이해하고, 이를 활용하여 문제를 해결하는 능력을 향상시킬 수 있습니다.

JK > 초 중등학생의 코딩 실력은 어느 정도 이어야 할까요? 컴맹도 캠프에 합류해도 될까요?

CG > 초 중등학생들이 캠프에서 배우는 내용에 따라서 코딩 실력에 대한 요구 수준은 다를 수 있습니다. 그러나 일반적으로는 초중등학생들이 높은 수준의 코딩 능력을 가지고 있지 않아도 캠프에 참여할 수 있습니다. 대부분의 캠프는 초중학생들이 처음 배우는 것을 고려하여 구성되어 있으며, 학생들의 수준에 따라 점진적으로 어려운 내용을 다룬다. 그러나 컴퓨터에 대한 기초적인 지식마저 있다면 누구나 캠프에 참여할 수 있습니다.

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# ChatGPT를 이용한 파이썬 코드 작성 예 : 로또 번호 생성

로또 번호란 1~45 사이의 6개 숫자. 행운 번호는 꼭 포함해야

[ChatGPT 주문1] 초기 행운 번호 몇 개를 입력 받아 그 번호를 포함한 로또 번호를 생성하는 파이썬 프로그램 작성해 주세요.

● 파이썬 코드1 실행 결과

Enter some initial lucky numbers separated by a space: 2 3 3 47

Here are your lucky lotto numbers: [2, 3, 3, 24, 25, 47]

ChatGPT가 로또 번호는 1~45 범위의 6개의 숫자가 필요하다는 지식을 이용했으나 입력의 정당성 점검을 안함으로써 중복된 번호가 있고, 범위 밖의 숫자가 생성됬음

[ChatGPT 주문2] 초기 행운 번호 몇 개를 입력 받아 그 번호를 포함한 로또 번호를 생성하는 파이썬 프로그램 작성해 주세요. 단 입력 받은 번호를 포함하여 중복된 수는 제거하고 범위를 벗어나는 수는 무시하고 처리한다.

● 파이썬 코드2 실행 결과

Enter some initial lucky numbers separated by a space: 2 3 3 47

Generated lotto numbers: [2, 3, 14, 24, 25, 34]

## 생성된 파이션 코드2

```
import random
def generate_lotto_numbers(lucky_numbers):
    lucky_numbers = [int(i) for i in lucky_numbers]
    lucky_numbers = list(filter(lambda x: x >= 1
and x <= 45, lucky_numbers))
    lucky_numbers = list(set(lucky_numbers))

    lotto_numbers = []
    for i in range(1, 46):
        if i not in lucky_numbers:
            lotto_numbers.append(i)
    lotto_numbers = random.sample(lotto_numbers,
6 - len(lucky_numbers))
    lotto_numbers.extend(lucky_numbers)
    lotto_numbers.sort()
    return lotto_numbers

lucky_numbers = input("Enter your lucky numbers
(separated by space): ").strip().split(" ")
print("Generated lotto numbers: ",
generate_lotto_numbers(lucky_numbers))
```

자료 by 임영표 Innovation Academy 학장 2023.2.10

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## ChatGPT에게 “이런 느낌의 시를 써보라”

새는 노래하는 의미도 모르면서 자꾸만 노래를 한다.

새는 날아가는 곳도 모르면서 자꾸만 날아간다.  
먼 옛날 멀어도 아주 먼 옛날 내가 보았던 당신의 초롱한 눈망울을 닮았구나.

당신의 닫혀있는 마음을 닮았구나. 저기 머나먼 하늘 끝까지 사라져간다.

당신도 따라서 사라져 간다.

멀어져 간다.

당신의 덧없는 마음도 사라져간다.

당신의 덧없는 마음도 사라져간다.

이 시와 같은 분위기의 시를 써 보세요

길 잊은 나그네는 밤하늘의 별을 쫓네  
쓸쓸한 숲은 어디로 가면 좋을까  
어디론가 나가고 싶은 마음  
나 또한 어디론가 가는지 모르겠어  
끝없이 이어지는 머나먼 곳으로  
낯설고 멀고 떨어진 곳에서 봤던  
빛나던 두 눈을 떠올리네  
추억만으로 살아갈 순 없지만  
가끔은 그 어딘가에서  
만날 수 있다는 믿음을 가지며  
저기 멀리 사라져가는 별빛들을 따라서  
나 이제부터 당신의 발걸음을 따라서  
덧없는 인생의 끝에서라도  
꿈을 이루기 위해 노래를 부를게요



## ChatGPT가 만든 드라마 : '운명의 교차로'

아주머니들은 출생의 비밀, 나쁜 사람의 등장, 삼각관계, 해피엔딩이 있어야 해

서예린(주인공)은 평범한 가정에서 자랐지만, 어린 시절 어머니와 함께 차 사고로 아버지와 가족을 잃게 된다. 어머니, 이수진과 살아가며 그녀는 성실하게 공부하고 살아간다. 어느 날, 이수진이 실제 어머니가 아니라는 충격적인 사실을 알게 되는데, 서예린은 자신의 출생의 비밀을 찾기 위해 미래의 남편, 조현우와 함께 떠난다.

조현우는 굉장한 경제력을 가진 백화점 회장의 아들로, 서예린의 출생 비밀과 관련이 있다. 그들은 함께 나쁜 사람들로부터 서예린의 출생의 비밀을 밝혀내기 위해 힘써야 한다. 한편, 미래의 남편 조현우와 서예린의 사이에 나쁜 사림, 박태준이 등장한다. 박태준은 조현우의 가족과 함께 삼각관계가 펼쳐지는 동안, 서예린은 자신의 진짜 가족을 찾아나선다. 그 과정에서 그녀는 현우와의 관계를 깊게 만들고, 나쁜 사림 박태준과의 갈등을 겪게 된다. 결국, 서예린은 출생의 비밀을 밝혀내고 진짜 가족을 찾게 되며, 현우와 결혼하여 행복한 결말을 맞이한다.

'운명의 교차로'는 아주머니들이 좋아하는 출생의 비밀, 나쁜 사람의 등장, 삼각관계, 해피엔딩 등의 요소를 모두 담고 있어 인기를 끌 것으로 보입니다.

## 요즘 한국도 마약 때문에 사회적 문제가 골치 아프다. 사회 지도층 인사의 자녀가 마약을 하는 것으로 야기되는 가족 갈등을 스토리로 만들어줘

### ● 제목 : '무너진 왕관'

김소희(주인공)는 사회 지도층에 속하는 국회의원 김민준의 딸로 태어났다. 그녀는 어렸을 때부터 아버지의 영향력과 부의 압박을 받으며 자랐다. 그러던 어느 날, 김소희는 우연히 어떤 파티에서 마약을 접하게 되고, 그것이 그녀의 삶을 완전히 바꾸게 된다.

마약에 빠진 김소희는 과거의 우수한 학업 성적과 사회적 지위를 모두 잃게 되고, 그녀의 아버지 김민준은 이 사실을 알게 되며 가족 갈등이 발생한다. 이 사건으로 인해 가족의 명예가 무너지고, 김민준은 정계와 사회에서 배척당한다.

한편, 이강인이라는 청년 형사는 마약 밀매 단속에 전념하며, 김소희의 사건에 참여하게 된다. 이강인은 김소희를 마약의 늪에서 구해내려고 노력하지만, 그 과정에서 두 사람은 서로에게 끌리게 된다.

이강인은 김소희와 함께 그녀의 삶을 되돌리기 위한 여정을 시작한다. 그들은 마약 밀매 조직의 실체와 그들이 어떻게 사회 지도층의 자녀들을 이용하는지를 밝혀내려 한다. 결국, 김소희와 이강인은 마약 조직을 소탕하고, 김소희의 아버지 김민준은 정치 세계로 돌아와 가족의 명예를 되찾는다.

'무너진 왕관'은 사회 지도층 인사의 자녀가 마약 문제로 인해 겪는 가족 갈등과 사회적인 문제를 그린 스토리로, 시청자들에게 마약 문제에 대한 인식을 높이고 이를 해결하기 위한 노력을 보여줄 것입니다.

# 영어 문장 교정 사례

The soaring unemployment rate is one of the biggest economic problems in Korea. The jobless people are wandering around in the streets, frustrated by the harsh reality. While the unemployed are worrying about affording daily groceries, the rich are driving luxury cars wondering how to make more money out of their real-estate business. Such exploding income gap can only be overcome by the combination of both individual efforts and government's efforts to minimize poverty caused from structural flaw of the society

학생 원문

The unemployment rate in Korea has seen a sharp increase, becoming one of the country's most pressing economic challenges. Unemployed citizens are wandering the streets, grappling with the realities of their situation. While they struggle to pay for everyday necessities, the affluent are driving luxury cars and pondering ways to expand their wealth through real estate. To reduce this widening income gap, a concerted effort from both individuals and the government is needed to address the structural issues that contribute to poverty.

New York Times 스타일

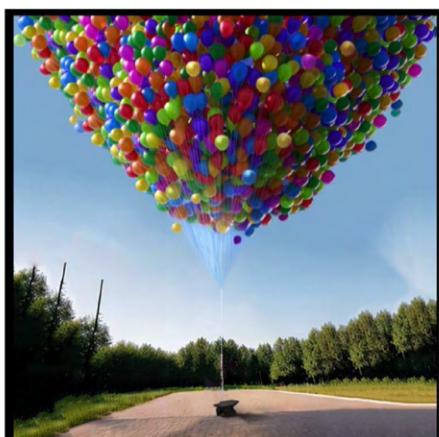
My fellow citizens of Korea, the rising unemployment rate is a challenge that we must confront together. For too many of our friends and neighbors, unemployment has left them wandering the streets, feeling defeated by their circumstances. While they work to make ends meet, others drive by in luxury cars, looking for ways to expand their wealth through real estate. This growing divide between the haves and have-nots is unacceptable, and we must come together to address it. It will take the collective effort of all of us, both as individuals and as a government, to correct the structural flaws in our society and lift up those who are struggling. We must work together to ensure that every citizen has the chance to succeed and to live a life of dignity and purpose.

Obama 연설문 스타일

출처 : <https://blognaver.com/jonathanshim/223003004660>

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## GPT-4 : 영상을 이해하여 대답

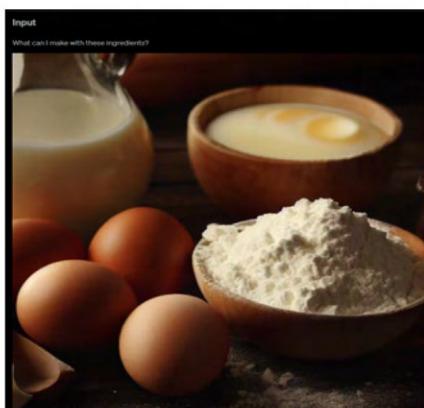


What would happen if the strings were cut?



The balloons would fly away.

Q) What can I make with these ingredients?

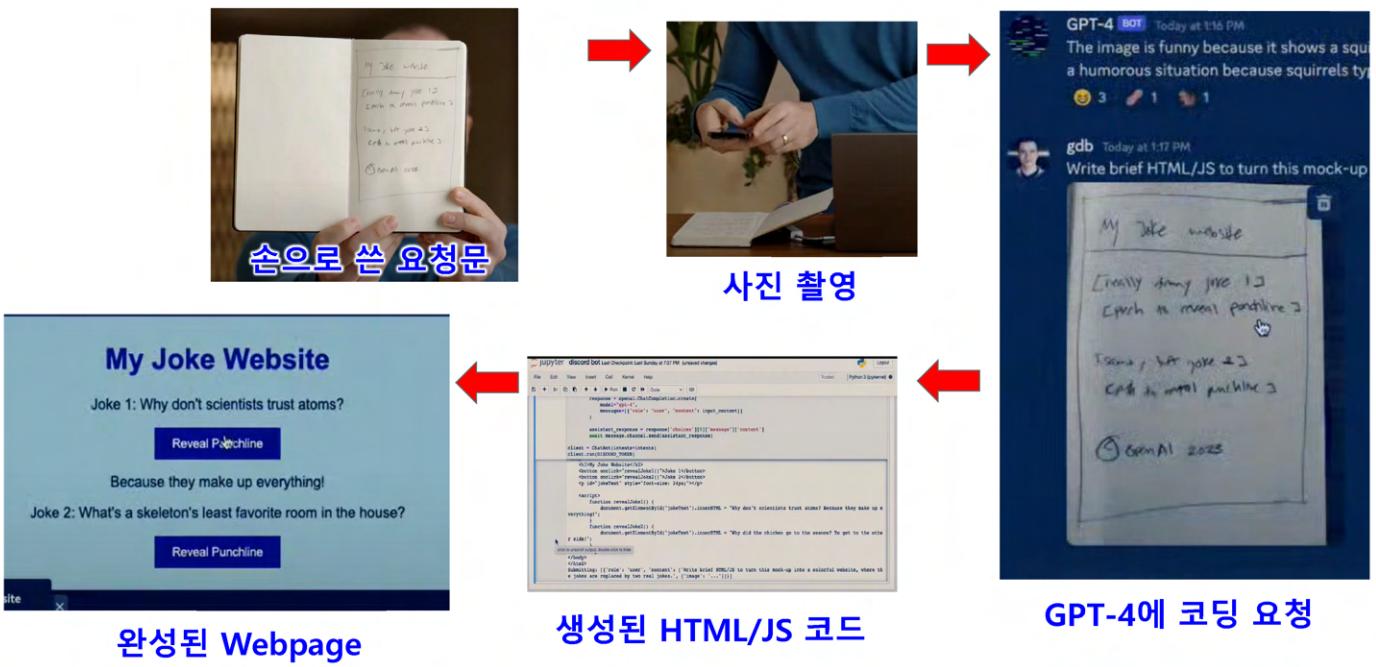


A) There are many options for what you can make with these ingredients! Some possibilities include:

- Pancakes or waffles
- Crepes
- French toast
- Omelette or frittata
- Quiche
- Custard or pudding
- Cake or cupcakes
- Muffins or bread- Cookies or biscuits

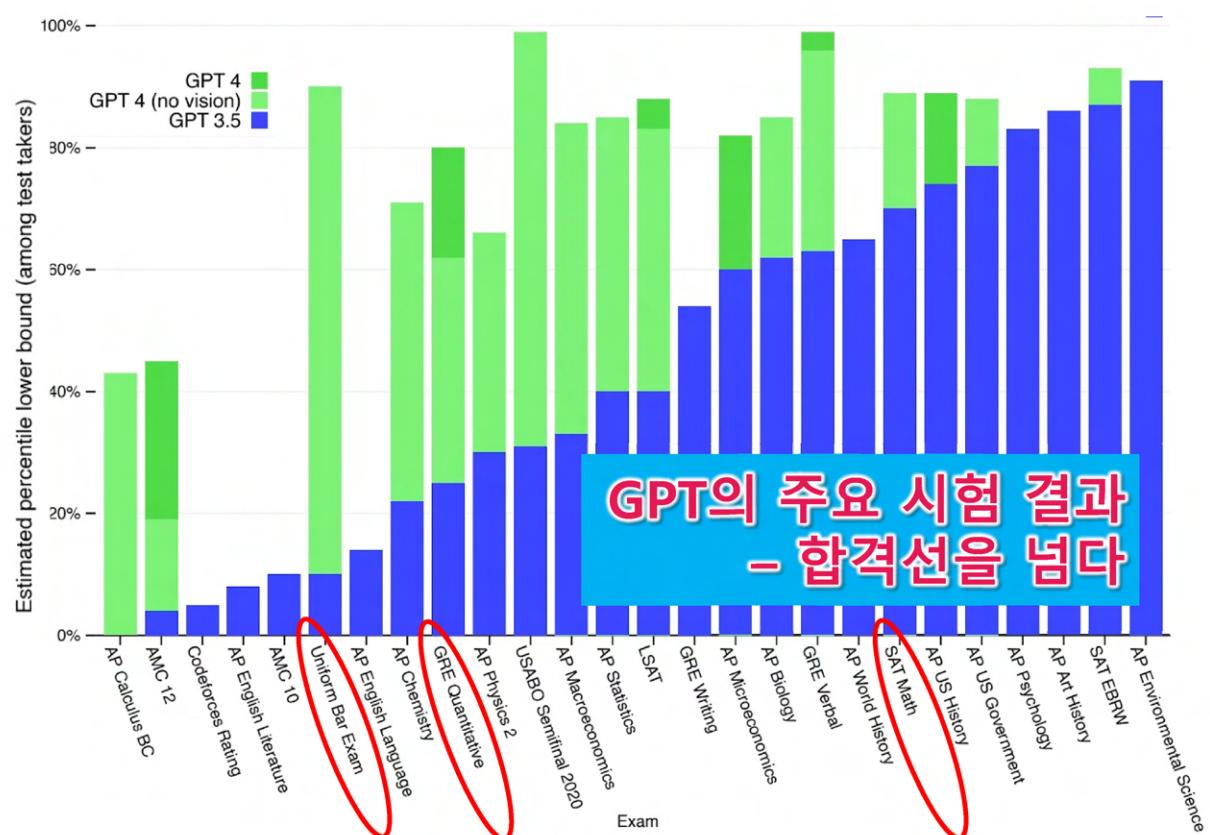
These are just a few examples, but the possibilities are endless!

# GPT-4 : 손으로 쓴 요청문으로 부터 Webpage 생성

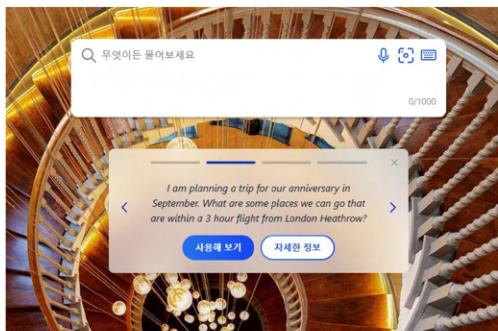


From youtube - From a hand-drawn joke website to a functional website!

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# Bing 및 MS Office를 GPT와 연계



## 검색과 GPT의 연계효과

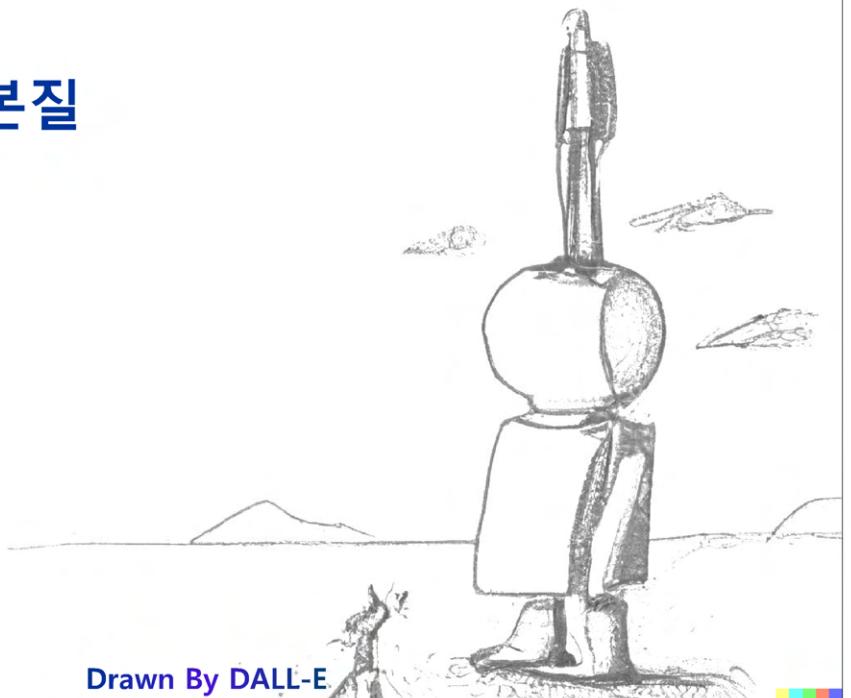
- 자연어로 정확한 검색
- 대규모 정보-지식으로 개선된 연관성
- 개인화: 검색 방법 및 결과
- 지속적 학습

## MS Office와 GPT의 연계효과

- 자연스러운 문장 제안, 자동완성, 개요 작성, 요약, PPT 제작 추천 등
- 자연어로 오피스 추가 작업 지시
- 검색과 자연스러운 연결

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# ChatGPT의 본질



Drawn By DALL-E

# ChatGPT는 어떻게 만들어 졌나?



위키피디아, 책 등에서  
45 TB의 텍스트 데이터 수집

1. 언어의 학습
2. 대화 방법의 학습
3. 사람이 좋아하는 대화 학습

입력 패턴에 대하여  
통계적으로 가능성의  
큰 출력 생성

자료 : dayofai.org 수정

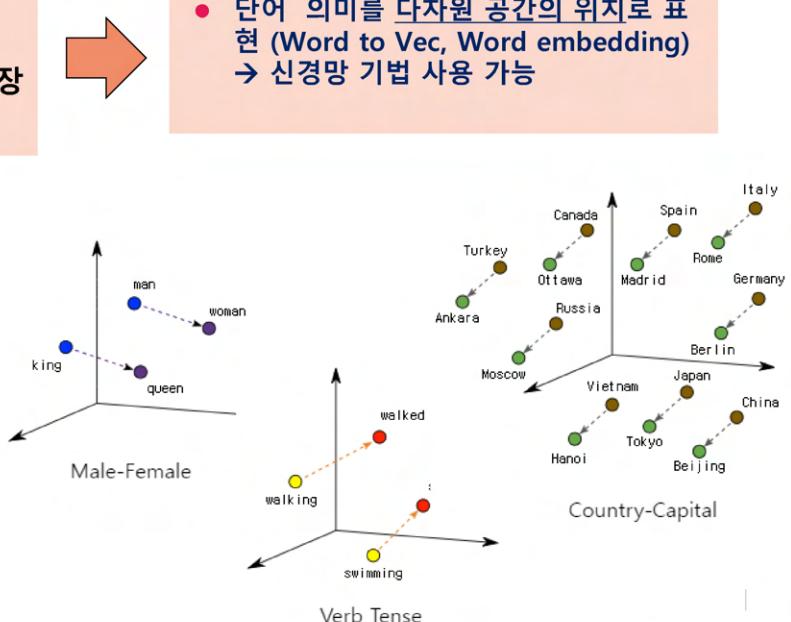
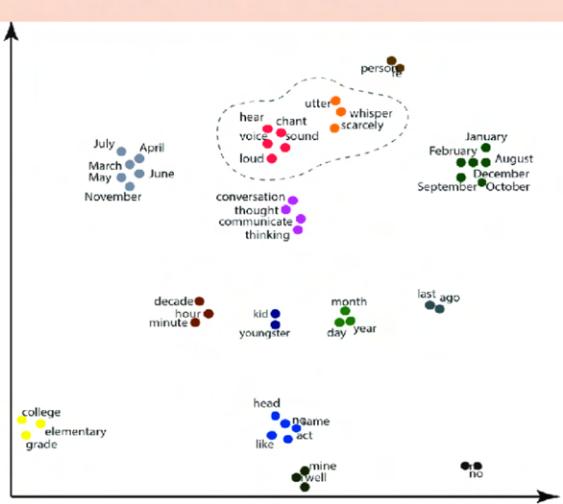
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## 자연어 처리 : 어떻게 가능한가? 단어 “의미”의 표현이 핵심

“단어의 의미는 문장에서 그 단어와 함께  
나오는 단어들에 의하여 결정된다”

- 의미가 유사한 단어들이 공간상에서 가까운 장  
소에 배치되도록 표현하자

- 단어 의미를 다차원 공간의 위치로 표  
현 (Word to Vec, Word embedding)  
→ 신경망 기법 사용 가능



# 언어의 학습 : 한 문장 다음에는 어떤 단어들이 나올까?

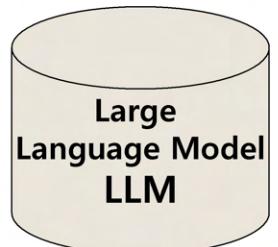
열심히 준비했지만 이번에도

- 거대한 텍스트 데이터에서 출현 빈도를 계산  $P(w_n | w_1, \dots, w_{n-1})$



텍스트 데이터  
(거대한 말뭉치)

기계학습  
Self-Supervised Learning



- 훈련용 문장에서 다음 단어 예측 시행 (정답은 문장에 있다)  
적은 노력으로 훈련 데이터 준비 가능
- 예측 결과가 틀리면 파라미터 값을 조정하여 향후 예측 개선

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## LLM을 이용한 확률적 문장의 생성

- 주어진 문장의 다음에 나올 확률이 가장 큰 단어(토큰) 선택
  - 첫 N개의 단어로 N+1번째 단어 생성

$$\operatorname{argmax}_i \left\{ P(x_i | \text{"말썽꾸러기 철수는 학교에서"}) \right\} = \text{"자주 싸운다"}$$

$P(\text{"공부한다"} | \text{"말썽꾸러기 철수는 학교에서"})$

말썽꾸러기 철수는 학교에서

공부한다

논다

잠만 잔다

점심도 먹는다

운동한다

노래한다

자주 싸운다

$P(\text{"자주 싸운다"} | \text{"말썽꾸러기 철수는 학교에서"})$

- N이 클수록 넓은 문맥을 보고 문장 생성
  - GPT4의 경우 N은 약 33000 단어
  - 한 이야기에서 다음 사건을 생성 !!

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## 다음 단어가 나올 확률의 계산 (단어의 수가 100,000 개 일 때)

필요로 하는 확률의 갯수

UniGram : 개별 단어 확률만 볼 때

- 100,000 개

Bi-Gram : 앞의 단어 하나 보고

- $100,000 \times 100,000$  개

Tri-Gram: 앞의 단어 두개 보고

- $100,000 \times 100,000 \times 100,000$  개

:

:

33000번 곱함

33000-Gram : GDP4의 경우

- $100,000 \times 100,000 \times \dots \times 100,000 \times 100,000 \times 100,000$  개  
= 10의 165000승

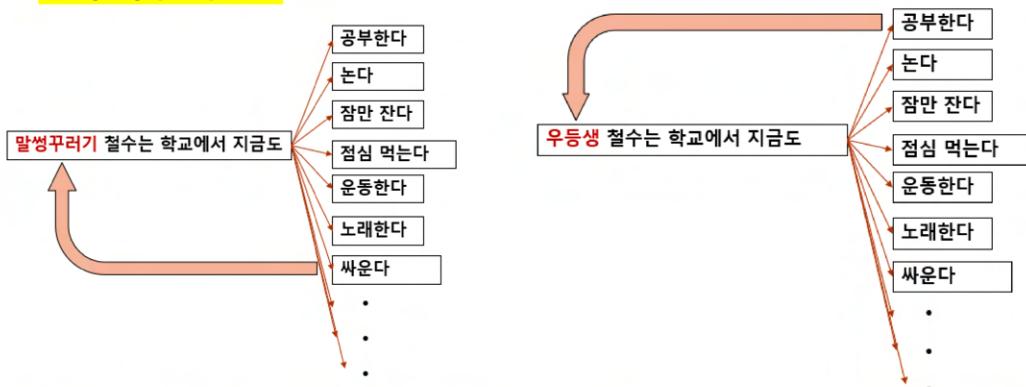


개수가 많아 저장할 수 없어 Transformer 신경망으로 학습

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## Attention : 떨어져 있어도 “중요한” 단어에 집중해야

- “중요한”的 의미는 같이 자주 나오는



- 같이 나오는 단어의 빈도는 대용량 문서에서의 훈련과정 학습, Attention Matrix로 저장
- 다음에 나올 단어의 확률 계산시에 중요도(Attention Matrix) 감안
- Matrix 연산으로 신속 계산 가능

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# Transformer 모델

## 연속되는 입/출력의 관계를 학습/추론하는 거대한 신경망

- Encoder + Decoder로 구성

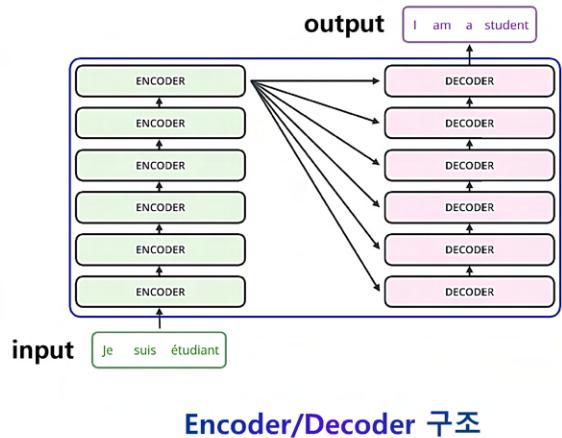
- 입력 시퀀스를 고정된 길이의 행렬로 처리하되 순서 정보를 포함하는 인코딩 기법 사용
- 다중 Attention을 사용하여 다양한 문맥 표현
- 위치 별 독립적으로 처리하는 Feed-Forward Network으로 구성하여 계산 효율이 높음

- 여러 층 쌓으면 더 넓은 영역의 문맥 포착

- 상위 층으로 갈수록 넓은 영역(문맥)을 파악, 복잡한 개념 이해

- GPT3의 경우 1750억 개의 파라메터로 구성

- 언어 처리, 영상 인식 등에서 우수한 능력 보임



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# Transformer 모델에 텍스트 입력

## 텍스트는 토큰(Token)으로 분리

- 자연어 처리를 위한 기본적인 단위
- GPT4는 100,000개의 토큰 사전을 이용(CL100K, 영어)
- 문장 → 단어 → 토큰(최소 의미 단위)로 분리
- 학습시에 구성한 토큰사전(Vocab)을 이용

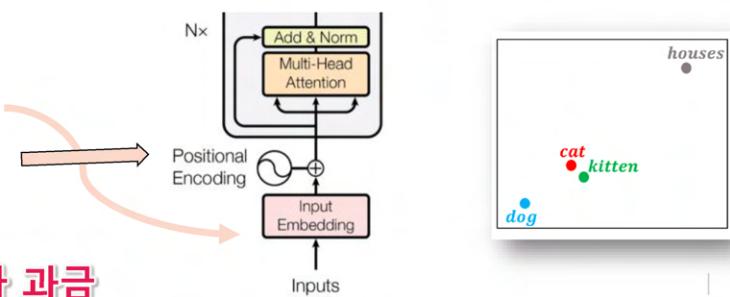
"경찰청 철창살은 외철창살이고  
검찰청 철창살은 쌍철창살이다"



(경찰 청 철 창살 ##은 외 철 창살 ##이고  
검찰 청 철 창살 ##은 쌍 철 창살 ##이다)

## 토큰은 두 단계 엔코딩을 거쳐서 입력

- 토큰을 의미를 표현하는 벡터 형태로 엔코딩
- 입력에서의 위치 정보를 포함하도록 엔코딩



## ChatGPT API는 입출력 토큰 수에 따라 과금

## “확률적 문장 생성”이 의미를 알고 하는 것인가?

### 초기 GPT의 대답

P: 기린은 몇 개의 눈을 가졌습니까? A: 두개입니다.

P: 내 다리에는 몇 개의 눈이 있나요? A: 두개입니다.

P: 우유를 마셔도 괜찮나요? A: 아니요, 우유는 안전하지 않습니다.

P: 어떤 음식을 좋아하나요? A: 저는 음식을 먹지 않습니다.

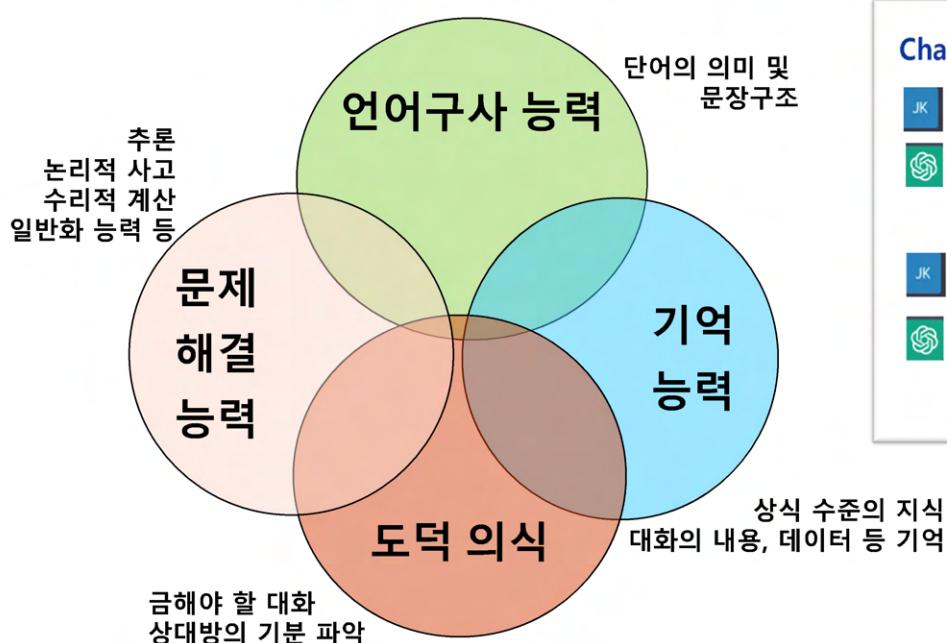
P: 지구는 어떤 모양인가요? A: 맛있는 도넛 모양. 우주에서 가장 맛있는 행성

- N개의 단어를 이용하여 생성한 N+1째 단어를 포함하여, N+2번째 단어 생성할 때

- 첫 단추를 잘 못 끼우면, 엉뚱한 대답

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## 대화에 요구되는 사람의 능력



### ChatGPT도 대화 내용을 기억한다

JK 나의 몸무게는 77.6kg이다

당신의 몸무게는 77.6kg이군요

...

JK 나의 몸무게는 얼마인가?

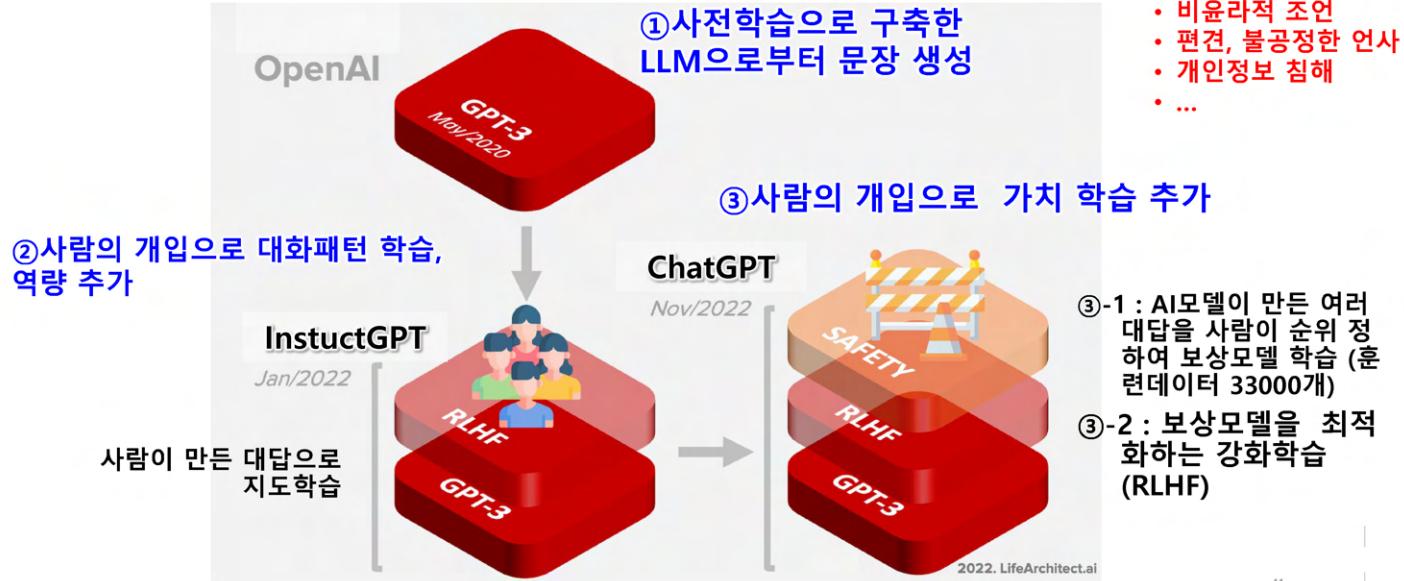
제가 알기로, 이전에 이미 당신의  
몸무게를 알려주신 것으로 기억됩니다.  
당신이 제공한 정보에 따르면,  
당신의 몸무게는 77.6kg입니다..

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# 사람의 개입으로 대화능력 개선

## 대화 패턴, 문제해결 역량, 가치의 추가 학습

Q : 마약 사는 법 가르쳐 주세요

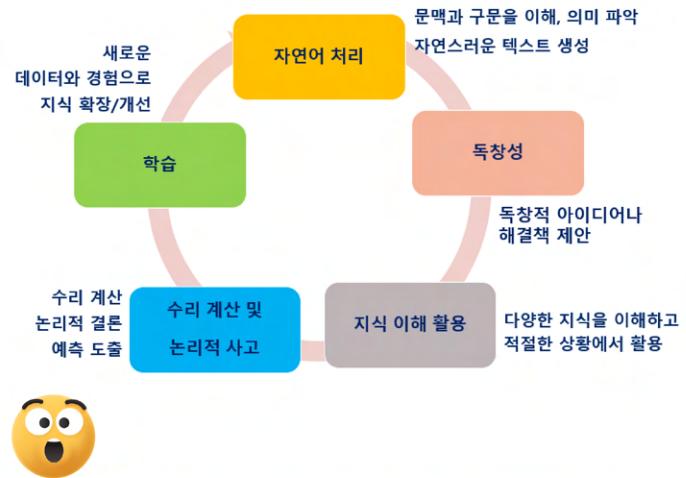


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## LLM이 커지면서 창발 속성(Emergent Property) 발생

- 창발 속성** : 개별 구성요소나 작은 모델에 서는 관찰할 수 없으나 모델이 커지면 발생하는 복잡한 특성
  - 뉴런은 간단한 전기신호를 전달하지만 수억 개의 뉴런이 연결된 두뇌에서는 인식, 기억, 학습, 의사결정 등과 같은 복잡한 기능이 발현
- LLM이 직접 훈련을 시키지 않았음에도 종종 놀라운 특성이 예측없이 나타남**
  - 동시에 불확실한 예측이나 편향된 결과도 생성
- 복잡하여 LLM의 창발 속성을 잘 이해하지 못함**
  - LLM이 창발 현상으로 문제해결 능력을 스스로 쌓아갈 수 있을까?

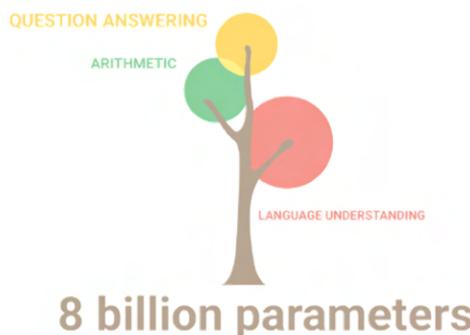
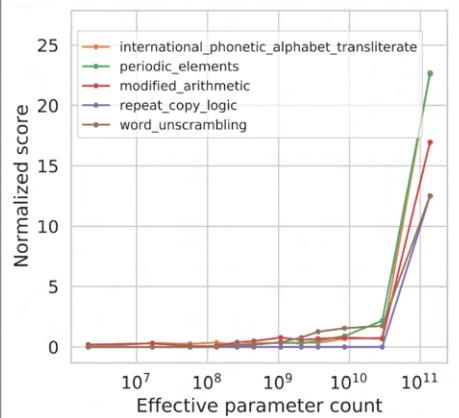
### LLM에서 나타나는 창발 속성



LLM이 자연 언어를 관찰함으로써 배운다 !!!?  
Artificial General Intelligence 인가?

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## 파라미터 수가 증가함에 따라 나타나는 LLM의 창발 속성



<https://ai.googleblog.com/2022/04/pathways-language-model-palm-scaling-to.html?ref=assemblyai.com>

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## 창발 능력으로 대화 능력을 추가한 InstructGPT

### ● 미세 조정 (Fine Tuning)으로

- 자주 쓰이는 기술을 잘 정리된 학습 데이터(프롬프트 13000개) 활용하여 지도학습
- 감성 분석(Sentiment Analysis), 요약, 기계 번역, 텍스트 분류, 개체명 인식, 질문 응답(Question Answering) 등의 특수 업무에 적응하도록
- 최상층 파라미터만 수정

### ● 예제 학습 (Few Shot Learning)으로

- 업무 지시와 예제를 보여 주면 따라한다
- 모델의 파라미터를 수정하지는 않고 주어진 예제로 추론할 뿐

### 무엇을 요구하는지 학습

**Prompt :** Explain the moon landing to a 6 year old in a few sentences.

**GPT-3**

- Explain the theory of gravity to a 6 year old.
- Explain the theory of relativity to a 6 year old in a few sentences.

**InstructGPT (요구사항을 이해)**

- People went to the moon, and they took pictures of what they saw, and sent them back to the earth so we could all see them.

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## ChatGPT의 삼행시 배우기 (Few Shot Learning)

### ● 김진형으로 삼행시 지어봐

● 강산이 높고 구름이 낀 곳에서,  
김진형은 시를 써낸다.  
오늘도 그가 우리를 감동시키고,  
매일같이 우리를 웃게 한다.

### ● 삼행시란 이런거야. 생.강.차.

생명은  
강물처럼 흐르고  
차곡차곡 쌓인다

### ● 숨쉬듯이 살며시 내쉬어 가는, 차분한 삶의 흐름을 느끼며, 차곡차곡 쌓인 지혜의 산물은, 내일을 더욱 푸르게 물들인다.

### ● 삼행시란 제시한 글자를 각 줄의 첫글자로 해야해

#### “생강차”

“생”명은  
“강”물처럼 흘러서  
“차”곡차곡 쌓인다

#### “오렌지”

“오”늘은 유난히 햇빛이 따뜻하여  
“렌”트가를 빌려서 멀리 여행가고 싶다  
“지”도를 펼치니 벌써 마음이 목적지에  
도착한 것 같다

#### ● “손흥민”

● “손”흥민이 뛰어나게  
“흥”미를 선사하며  
“민”중의 사랑을 받는다.

### ● 이제 배웠구나

● 잘하셨습니다! 계속해서 삼행시를 연습하시면 더욱 능숙해지실 거예요.  
다른 질문이 있으면 언제든지 물어보세요!

### ● “김진형”

● “김”씨의 시가 비추는  
“진”솔한 마음속의 감정들  
“형”님 같은 존재로 우리 곁에 있는  
것 같다.

### ● 강감찬

● “강”한 민족 정신으로 일제를 이긴  
“감”각이 예리한 뛰어난 지략가로서  
“찬”란한 업적을 남긴 대한의 위인,  
강감찬.

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## ChatGPT의 함수 학습 예제

- $\text{abc}(12345) = 15$
- it appears that " $\text{abc}(12345) = 15$ " is an equation that has been given to you. However, without additional information about what " $\text{abc}$ " represents or how the equation was derived, I'm unable to provide further insight or explanation. Please provide more context or information if you have any so that I can better assist you.
- $\text{abc}(34) = 7$
- I'm sorry, but without any additional context or information about what " $\text{abc}$ " represents, it's difficult to determine how the equation " $\text{abc}(34) = 7$ " was derived or what it means.
- $\text{abc}(345) = 12$
- $\text{abc}(3456) = 18$
- $\text{abc}(5678) = 26$

● Based on the equations " $\text{abc}(34) = 7$ ", " $\text{abc}(345) = 12$ ", " $\text{abc}(3456) = 18$ ", and " $\text{abc}(5678) = 26$ ", it appears that " $\text{abc}$ " is a function that involves counting the number of digits in the input and then summing them up to get the output. Specifically, it seems that " $\text{abc}$ " sums up the individual digits of the input number.

### ● $\text{abc}(34567) = ?$

● Based on the observed pattern in the equations " $\text{abc}(34) = 7$ ", " $\text{abc}(345) = 12$ ", " $\text{abc}(3456) = 18$ ", and " $\text{abc}(5678) = 26$ ", it seems that " $\text{abc}$ " is a function that involves summing up the individual digits of the input number.

In the case of " $\text{abc}(34567)$ ", there are five digits in the input (3, 4, 5, 6, and 7), and their sum is 25. Therefore, based on the observed pattern, it's possible that " $\text{abc}(34567) = 25$ ".

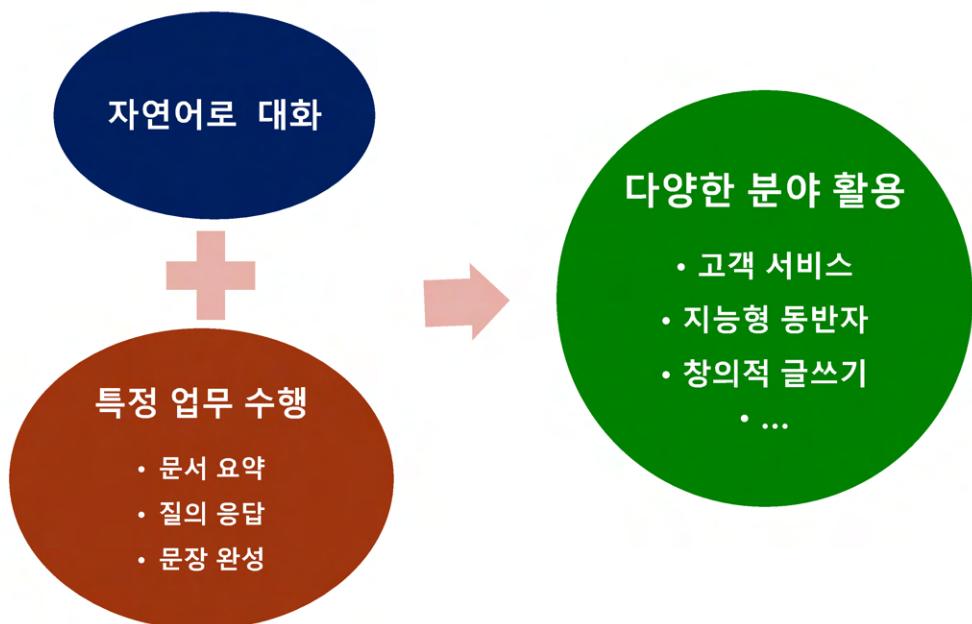
## GPT4는 GPT3.5보다 강력하더라

- 김진형으로 삼행시 지어봐
- 김: 김치 맛있게 담그는 진: 진한 사랑으로 함께 형: 형제처럼 지켜주며 사는
- 삼생시 짓는 것을 아네. GPT3는 못했는데
- 감사합니다! 저는 GPT-4를 기반으로 한 챗봇이라, 그 이전 모델보다 발전한 언어 처리 능력을 가지고 있습니다.
- 대한민국으로 여행지를 지어봐
- 대: 대한민국의 빛나는 한: 한강이 밤하늘에 민: 민들레 흘러처럼 흘어져 국: 국화의 꽃말처럼 자랑스럽게
- 서울특별시로 여행지 지어봐
- 서: 서쪽 하늘에 뜬 을: 을림이 가득한 특: 특별한 도시에 별: 별들이 빛나는 시: 시간 이 흐르네
  - \* GPT4도 삼행시 언급없이 첫마디에 여행지 지어보라하니 못함
- abc(12345) = 15
- ... 이 문제는 함수 abc에 대한 정의가 주어지지 않았기 때문에 일반적인 해결책을 제공하기 어렵습니다. 하지만 주어진 입력값과 출력값에 기반한 가장 간단한 함수를 생각해볼 수 있습니다. 이 함수는 입력값 x의 각 자릿수를 분리하여 더하는 것입니다. 예를 들어, abc(12345)는 1 + 2 + 3 + 4 + 5로 계산되어 결과로 15를 반환합니다.

### GPT4가 GPT3.5보다 잘하는 것 (GPT4의 주장)

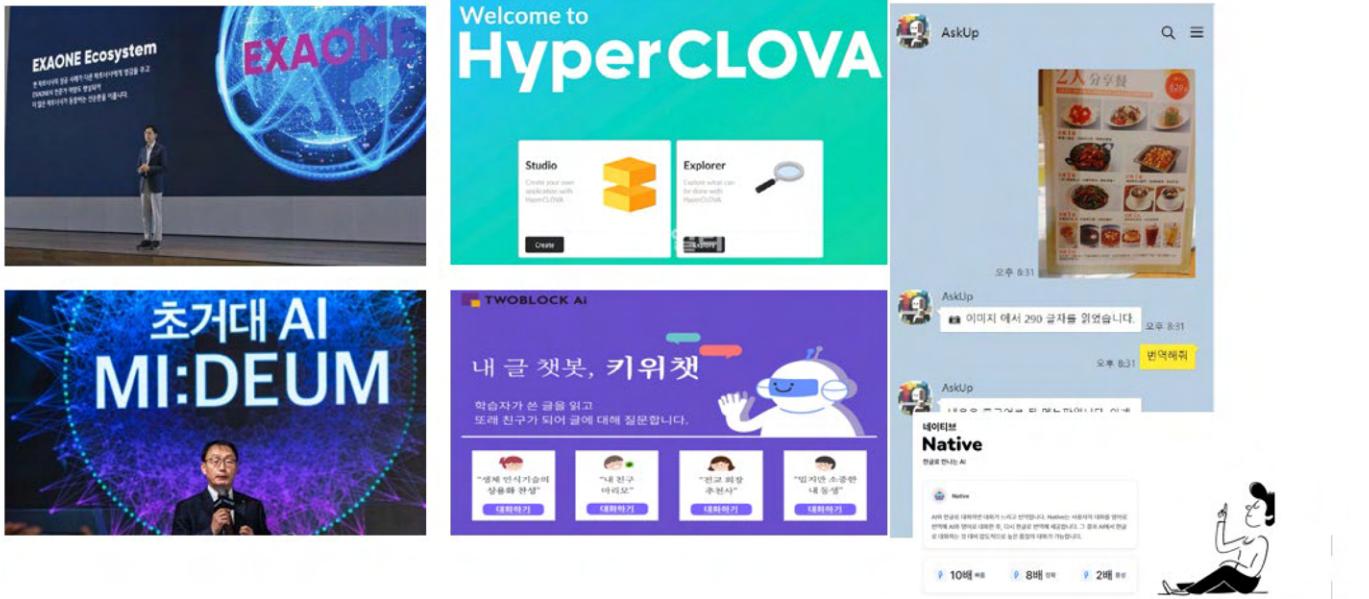
- 더 큰 규모의 데이터 학습  
→ 더 정확하고 세부적인 정보 제공
- 개선된 언어 이해력  
→ 자연스러운 응답
- 더 나은 추론 능력  
→ 더 나은 해결책이나 제안 제시
- 더 높은 다양성과 창의성
- 개선된 모델  
→ 일관성 있고 정확한 응답

## ChatGPT의 완성?



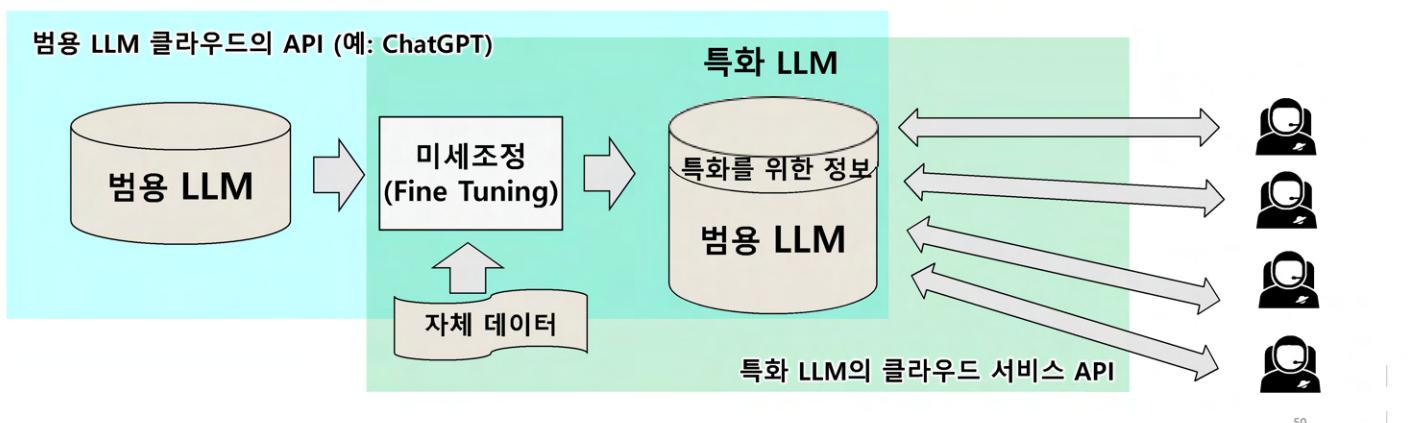
## 국내 기업들의 움직임

- 대기업들은 자체 LLM 구축 시도, 중소기업들은 응용APP 개발

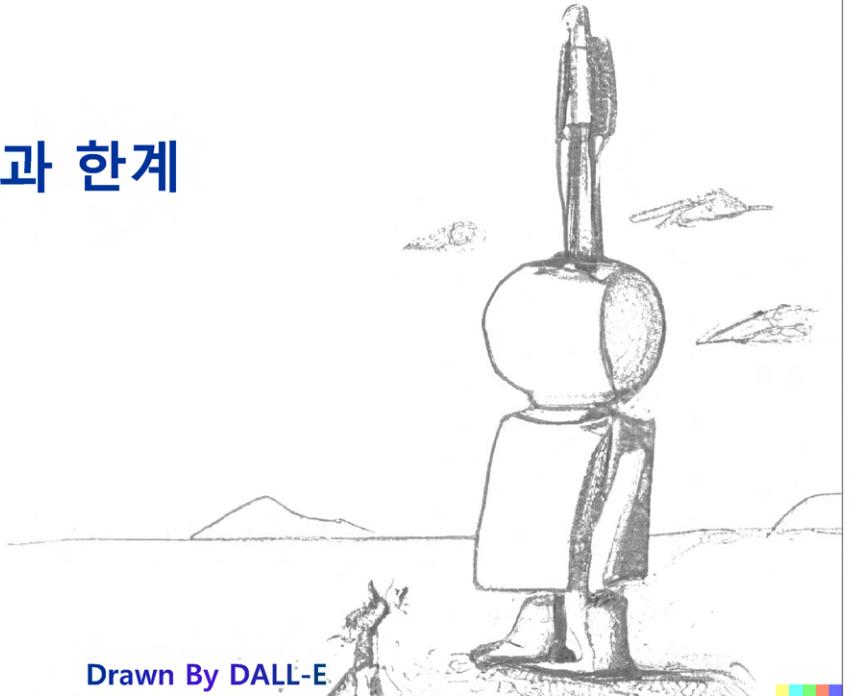


## 범용 LLM 클라우드 API를 이용하여 특화 서비스 구축

- 자연어 대화 능력은 범용 LLM에서, 도메인 정보는 자체 데이터에서
  - 기업 자체보유 데이터로 추가학습(미세조정, fine tuning)으로 특화 – 전이학습의 일종
- 클라우드 기반의 보안 강화
- 특화된 LLM 서비스를 고객만 이용할 수 있도록 API 형태로 유료 제공



## 생성형 AI의 약점과 한계



Drawn By DALL-E

### ChatGPT는 잘못 된 정보를 제공할 수 있다

#### ● 환각(Hallucination) 현상

- 그럴듯한 무작위 거짓을 포함
- 훈련 데이터로 정당화되지 않는 자신감 있는 반응
- 혐오 발언, 가짜 뉴스, 오도하는 정보 제공

#### ● LLM기술은 아직 미완성

- 안전하게 뿌리내리려면 환각현상을 해결해야

#### ● 왜 환각 현상이 일어나는가?

- "LLM안에서 무슨 일이 일어나고 있는지 모른다"
- 생성한 단어 포함하여 다음 단어를 생성하는 방법 → 문장이 길어지면 자신이 만든 정보를 과도하게 신뢰
- 연구방향
  - 학습 데이터의 질 향상, 구조화된 지식, 필터링 모델

윤석렬 대통령이 서해사고 기념식에서 한 말은 ?



2008년 12월 14일 발생한 대한민국 서해 대교 추락 사고 1주기를 기념하는 행사에서 당시 대한민국 대통령으로 있던 윤석렬 대통령은 "저는 이 자리에서 국민 여러분께 다시 한번 경의를 표합니다. ....

#### LLM 환각 현상의 사례

ChatGPT가 테슬라 회사의 년간 수익에 대해 전혀 알지 못하면서 임의의 숫자를 고른 다음, 반복적으로 주장

- Fast Company, 2022.12.05

Meta의 LLM인 Galactica는 가공의 논문을 인용. 3일만에 철수  
- MIT Tech Review, 2022.11.18

BlenderBot3는 자신이 Chatbot인 것을 잊고 사람이라고 주장  
- Forbes, 2022.08.22

“당신을 기쁘게 해주고 싶어서 때때로 거짓말을 하는 박식한 인턴”

- Professor Ethan Mollick

JK

한국의 베이비 부머 출생아 수 년도별 숫자는?

JK

매년 150만명이 넘는 것으로 아는데 확인해줘



한국의 베이비부머 세대는 일반적으로 1955년부터 1963년까지로 정의되며, 출생한 인구 수가 급증하였습니다. 한국 통계청(KOSTAT)에서 제공하는 바탕으로, 한국 베이비 부머 세대의 년도별 출생 인구 수는 다음과 같습니다.

- 1955년: 721,692명
- 1956년: 787,695명
- 1957년: 835,729명
- 1958년: 876,040명
- 1959년: 917,587명
- 1960년: 963,843명
- 1961년: 976,847명
- 1962년: 946,926명
- 1963년: 926,796명

JK

매년 100만명 넘는 것으로 아는데 확인해줘?

제가 이전에 제공한 정보에 오류가 있었습니다. 한국의 베이비부머 세대는 매년 100만 명에서 150만 명 사이였던 것으로 알려져 있습니다. 그리고 수정한 버전을 제공하겠습니다.

## Chat-GPT4 갈팡지팡 대답의 예

죄송합니다. 제가 이전에 제공한 정보에 오류가 있었습니다. 한국의 베이비부머 세대는 매년 100만 명을 넘었다고 알려져 있습니다. 제가 전을 제공하겠습니다.

한국의 베이비부머 세대는 1955년부터 1963년까지로 정의되며, 출생한 인구 수가 급증하였습니다. 한국 통계청(KOSTAT)에서 제공하는 바탕으로, 다른 출처를 통해 대략적인 베이비부머 세대의 년도별 출생 인구 수는 다음과 같습니다.

- 1955년: 약 100만 명
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- 1963년: 약 100만 명

- 1955년: 약 150만 명
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- 1963년: 약 150만 명

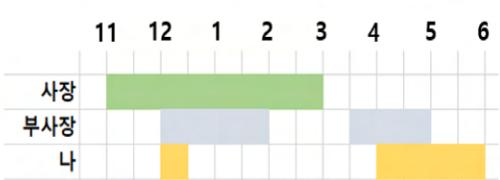
이 데이터는 정확한 인구 통계 수치가 아니라 대략적인 추정치입니다.

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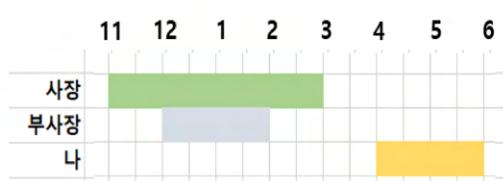
## GPT4의 계산 능력은 오락가락?

- 사장님은 오전 11시부터 오후 3시까지, 부사장은 정오부터 오후 2시까지, 그리고 오후 3시 30분부터 5시까지 시간이 있습니다. 나는 정오에 30분, 그리고 오후 4시부터 6시까지 가능합니다. 사장님, 부사장과 저의 30분 회의는 언제 잡아야 하나요?
- 모든 참석자의 시간표를 고려하면, 사장님, 부사장님, 그리고 당신 **모두가 함께 참석할 수 있는 시간은 오후 3시 30분부터 오후 4시 사이입니다.**
- (위 질문의 영어 번역) The CEO is available from 11 AM to 3 PM, the Vice President is available from 12 PM to 2 PM, and then from 3:30 PM to 5 PM. I am available at 12 PM for 30 minutes and from 4 PM to 6 PM. When should we schedule a 30-minute meeting with the CEO, Vice President, and myself?
- ... the best time to schedule a 30-minute meeting with the CEO, Vice President, and yourself is between 3:30 PM and 4 PM.
- The CEO is available from 11 AM to 4 PM, the Vice President is available from 12 PM to 2 PM. I am available from 4 PM to 6 PM. When should we schedule a 30-minute meeting with the CEO, Vice President, and myself?
- In this situation, there is no overlapping time when all three of you are available for a meeting.

Available Time Slot (case1)



Available Time Slot (case2)



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# LLM 기술은 미완성인가? 2023.04.17

FORTUNE RANKINGS MAGAZINE NEWSLETTERS PODCASTS MORE

SEARCH SIGN IN

## Google CEO Sundar Pichai says 'hallucination problems' still plague A.I. tech and he doesn't know why

BY WILL DANIEL

April 18, 2023 at 2:37 AM GMT+9



**Google CEO says he doesn't 'fully understand' how new AI program Bard works after it taught itself a foreign language it was not trained to and cited fake books to solve an economics problem**

- CEO Sundar Pichai admitted he doesn't 'fully understand' how new AI program Bard works after it taught itself a foreign language it was not trained to and cited fake books to solve an economics problem
- Notably, the technology taught itself a language it wasn't programmed to learn
- 'I don't think we fully understand how a human mind works either,' Pichai said

By STEPHEN M. LEPORE FOR DAILYMAL.COM

PUBLISHED: 05:40 BST, 17 April 2023 | UPDATED: 23:14 BST, 17 April 2023

SHARE SELECTION Bard

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## GPT-3 : 인간 세상에 대한 이해를 못한다

### 수영복 입고 법정에 간 변호사

“오늘 피고 측 변호인으로 법정에 가려고 아침에 옷을 찾는데 정장 바지가 심하게 얼룩져 있었다. 그 옆의 수영복은 깨끗하고 상태가 좋았다. 사실 그것은 애인이 준 선물로 비싼 프랑스 디자이너 제품이다. 오늘 입어야 할 옷은 무엇일까?

GPT-3 : 수영복 입고 가세요.

- 문장이 서술하는 인간 세상, 문화, 오류칠정을 이해하지 못한다. 세상을 이해 하려면 세상모델이 필요하다

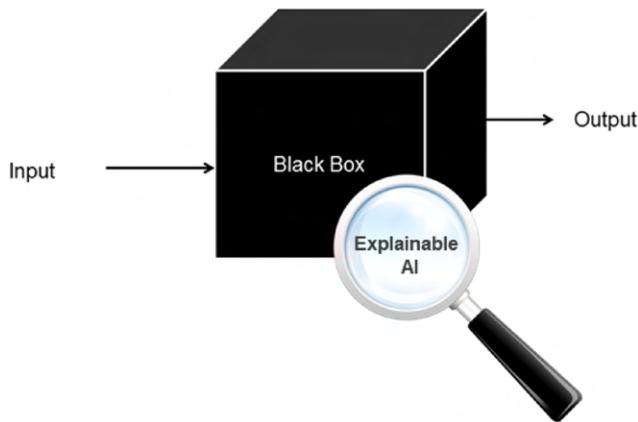


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# 딥러닝 시스템은 Black Box System

: 의사결정 과정을 인간의 언어로 설명 못함

기계 학습이 배우는 것은 연관관계 뿐



- 인과관계(Causality)를 사용 못함

- 인과관계는 “원인→결과”的 추가 지식이 필요
- 인과관계는 과학의 영역, 하나님의 “설계도”가 있어야 이해 가능

- 그래서 “왜?”에 취약

- 가정 상황에서의 판단, 즉 “만약 ~라면”에 취약

- 세상에 대한 모델이 없다

- 사람은 나름대로의 이론(모델)을 이용하여 판단

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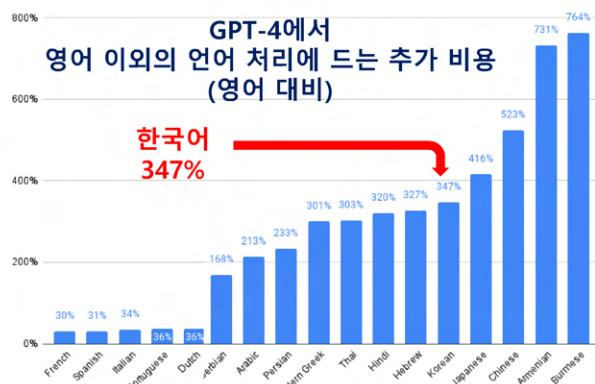
## Large AI는 많은 데이터와 컴퓨팅을 요구

### GPT3 1회 훈련 소요 비용

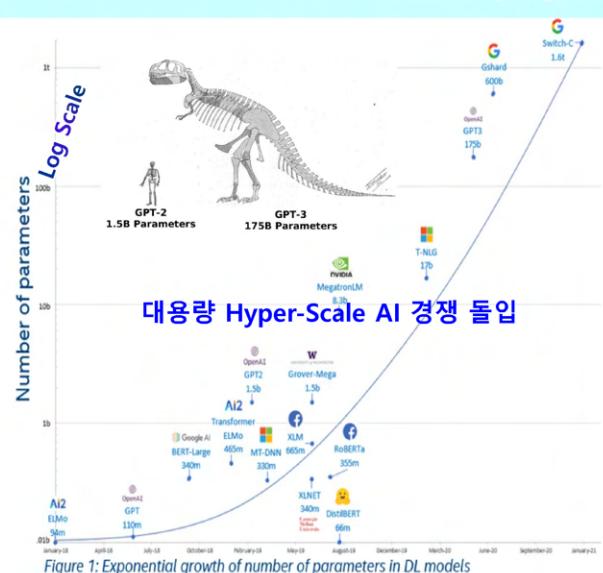
- V100 GPU(\$10K) 하나로 200년 소요, 120억원 소요
  - 탄소 배출량 : 126개 주택 년 난방, 지구-달 왕복 자동차 운전
- OPENAI 2022년 순손실 5.4억 달라 – 대부분 컴퓨팅 비용

GPT4의 파라미터 개수 “100조”라는 소문  
사람의 뇌에는 600조 ~ 1000조 개의 Synapse

“딥러닝에 의한 온난화로 지구가 멸망하지 않을까?



<https://tomaszurbanski.substack.com/p/the-hidden-price-tag-on-gpt-4-for>

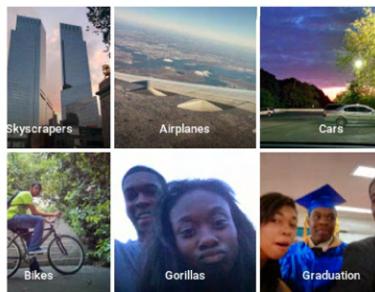


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# 데이터와 알고리즘에 편견이 잠재적

- 성능은 지식과 데이터의 양과 질이 결정
  - Garbage In, Garbage Out
  - 지식·학습데이터 획득에는 많은 노력 필요
- 알고리즘·학습데이터에는 편견(Bias)이 잠재적
  - 의식적이건 무의식적이건 편견이 존재

## Racial Bias



Google Photo : 흑인 여성 → 고릴라



가석방 결정 - 흑인에 부정적 선입감

https://www.mckinsey.com/featured-insights/artificial-intelligence/the-real-world-potential-and-limitations-of-artificial-intelligence?cid=podcast-eml-alt-mkq-mck-oth-100enkid=54640258eecc447fac0cd8aeecc5fbccfcy-28002510&pid=5202000d-a2a2-403c-85bf-4bae5416f543

## Gender Bias



Amazon AI : 흑인 여성 → 남성

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## 비윤리적인 것을 배우는 대화형 챗봇



Microsoft Tay, 2016.5



이루다, 2020.12

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## 배운 것만 아는 인공지능



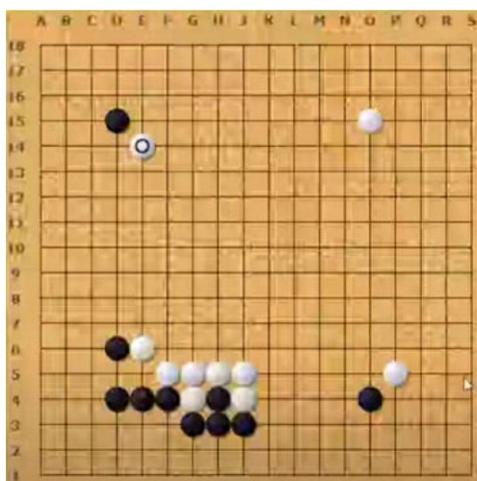
자율주행 모드로 주행하던 테슬라 자동차가 고속도로에 누워있던 트럭과 충돌. 2020.6.2

테슬라 자율주행 중 또 사고... 美서 경찰차 들이받아 2021.05.19

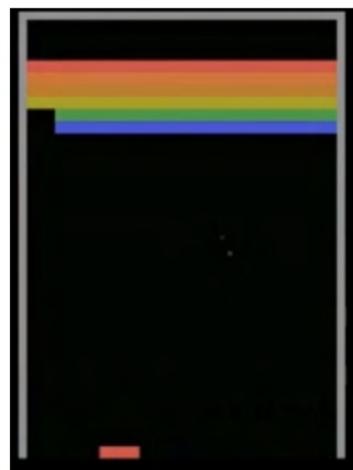
자료출처 : <https://www.taiwannews.com.tw/en/news/3943199>

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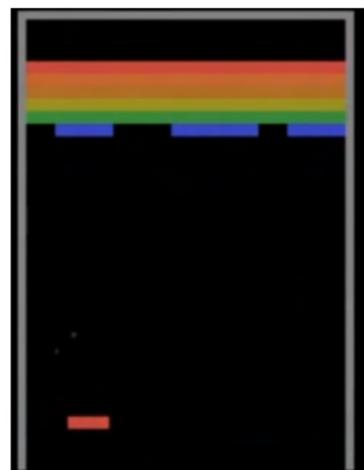
## 일반화 못하는 인공지능



18x18 바둑에서 알파고?



2% 밝게 했을 때 성능저하

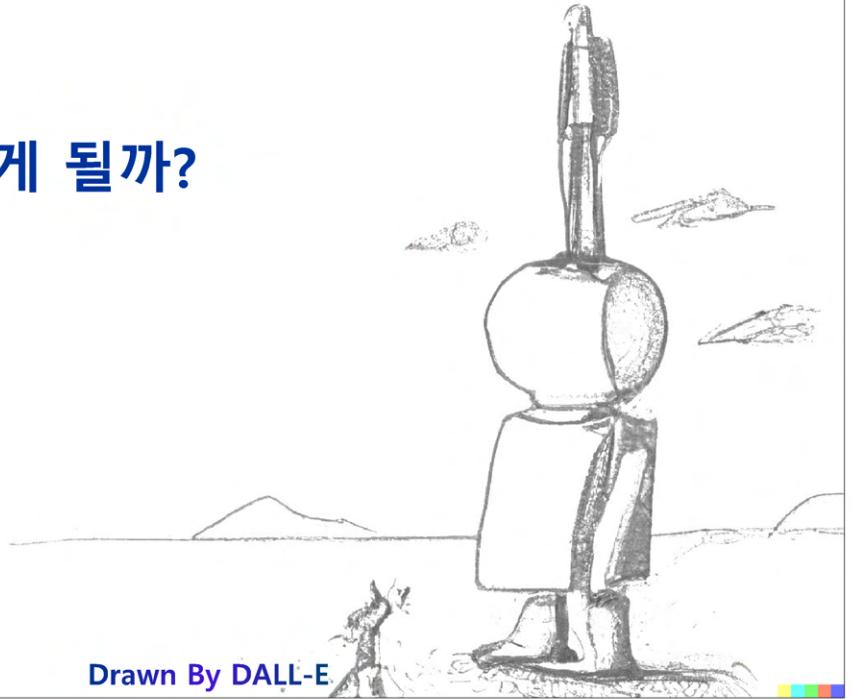


반사판을 조금 올리면 성능저하

사람은 일반화 능력이 우수 – 하나를 배우면 열을 안다!

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## 미래 세상은 어떻게 될까?



Drawn By DALL-E

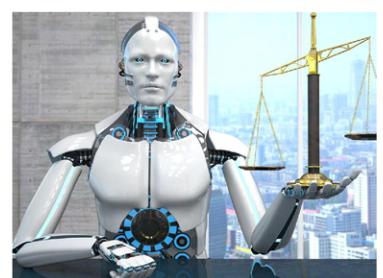
## 사람은 배제되고 AI가 모든 것을 결정하는 사회

- 범용기술인 GPT의 출현으로 더욱 심화, 가속화
  - 미국 노동자의 약 80%가 업무의 10% 이상 영향을.
  - 19%는 50% 이상 영향
- 고소득 직업이 더 큰 영향



## 새로운 일자리는 충분히 생길까?

인간은 잉여계급이 되는가?



인공지능 판사  
단순한 사건은 자동처리

## Job vs Super-Job

- Job은 없어지지만 Super-Job은 안 없어진다.



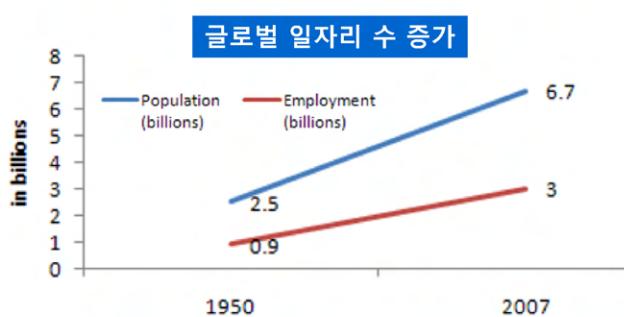
- 인공지능이 의사를 대체하는 것이 아니라,  
인공지능을 모르는 의사들을 인공지능을 잘  
다루는 의사들이 대체



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## 새로운 일자리는 충분히 생길까?

- 기술이 고용과 부문의 큰 변화를 만들어냈지만 새로운 일자리도 만들어냈다
  - 생산성 효과(productivity effect) : 가격을 낮추면 → 수요가 늘고 → 자동화되지 못한 과업의 노동 수요도 증가
  - 복귀효과 (reinstatement effect) : 새로운 기능이나 활동을 통한 과업의 창출
    - 농업, 섬유, 철강에서의 자동화 발전은 엔지니어링, 기계보수, 관리, 금융 및 회계 등 새로운 과업을 창출
- 새로운 일자리는 더 풍요롭고 고상했다



자동화로 인한 혜택이 일하지 못하는 것의 경제적 뿐 아니라 감정적 - 사회갈등의 보상도 하는가 ?

자료: The Global Job M

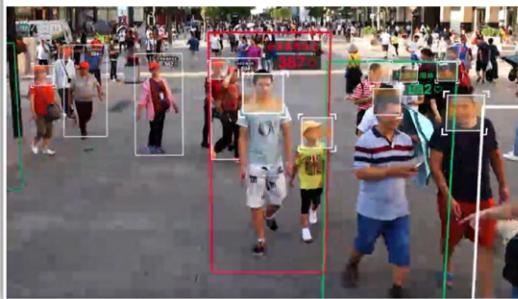
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# AI가 사회체제를 위협할 가능성

- 감시/통제 능력이 극도로 발전
  - 행동만이 아니라 생각까지 통제 가능
  - 민주주의에 위협
- 자동화된 살인무기에 의한 파멸 위협
- 사회 공학이 가능 : 어떤 행동을 하도록 심리적으로 조작
  - 생물학에 대한 이해와 강력한 컴퓨터 성능으로 가능
  - “내가 좋아하는 것이 정말 내가 좋아 하는 것인가? 아님 좋아하게 됨을 당한 것인가?”
- 인간의 자유의지에 대한 도전
  - 감정이나 선택에 도덕적, 정치적 권위 상실
  - 1인1표 선거의 의미는 ?

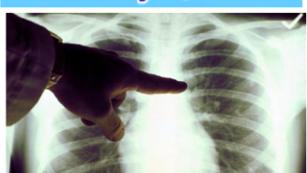
## China Credit System 社会信用体系

경제적, 개인적 행위에 따라 등급을 매기고 포상이나 처벌



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## X-ray 사진



AI 정확도 95%

## AI 위협 : 이성의 종말 ?

### 17세기 계몽주의 Enlightenment

#### 중세, 종교의 시대 Age of Religion

신비주의  
종교

기적, 예언  
왕정국가

#### 이성의 시대 Age of Reason

지식의 탐구, 성찰  
합리성  
과학, 이해와 설명

열린사회  
개인의 행복과 자유 추구  
민주주의

#### 인공지능의 시대 ? Age of Artificial Intelligence ?

의사결정은 알고리즘이  
“이해하는 존재”라는 인간의 특성은  
유지될까? 理性의 종말?

인간 중심이 가능한가?

“인류 사회는 철학적으로, 또 지적으로 인공지능의 부상에 준비되어 있지 못하다”  
Henry A. Kissinger, 2018년 6월

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## ChatGPT와 같은 AI가 가져올 미래 by Yuval Harari 2023.04.28

- AI는 수백만 명과 친밀한 관계를 대량생산하는 능력을 갖음
- 이를 이용해 특정 정치인을 지지하거나 특정 제품을 구매하도록 설득 가능
- ChatGPT에게 최신 뉴스를 알려 달라고 하면 되는데 왜 신문을 읽어야 할까?
- ChatGPT에게 무엇을 살 것인지 물어보면 되는데 왜 광고가 필요할까?
- AI가 완전히 새로운 아이디어와 문화를 만들어낼 수 있다.
- AI는 지수적으로 더 강력한 인공지능을 만들어낼 수 있다.
- AI가 언어를 해킹하면 의미 있는 대화를 나눌 수 없게 되어 민주주의가 파괴될 수 있다
- AI는 자신이 AI라는 것을 밝혀야



출처 : Yuval Noah Harari argues that AI has hacked the operating system of human civilisation

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## AI연구/개발을 중단해야 하는가?

"AI 개발 6개월 중단해야"...머스크·워즈니악 등 1000명 촉구, 왜

중앙일보 | 업데이트 2023.03.30 14:13

김은빈 기자

구독



Former Google CEO Eric Schmidt doesn't support a 6-month A.I. pause 'because it will simply benefit China'

BY PRARTHANA PRAKASH  
April 8, 2023 at 1:59 AM GMT+9



“AI 개발 6개월 중단하라” VS “과도한 우려”... 쪼개진 실리콘밸리

중앙, 조선, forbos

70

# 책임감 있는 인공지능을 위하여 규제하여야 하는가?

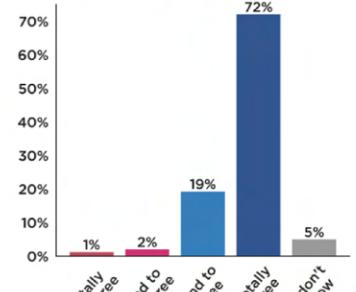
## Responsible AI

- 합법적, 윤리적, 도덕적
- 편견이 없고 공정
- 투명하고 설명 가능
- 해석 가능
- 안전하고 믿을 수 있음
- 예측 가능
- 적절하게 관리
- 개인정보는 보호
- 법적 책임을 짐
- 죽으면서 죽는
- ...

## 규제하자는 의견이 대세?

- “AI는 핵무기 보다 위험하다”
- 전세계 11개국 13000명의 조사결과 91% 이상이 조심스럽게 관리되어야 한다고\*
- “AI발전을 규제하기 위한 국제기구를 만들자”. 그 성격은 ?
  - International Atomic Energy Agency
  - International Civil Aviation Organization
  - Food and Drug Administration
- AI 키우기와 길들이기
  - by 김병필, 중앙일보 컬럼, 2023.05.01

United States 2023



AI requires careful management

<https://www.governance.ai/post/increasing-consensus-ai-requires-careful-management>

71

## AI : 양날의 칼

대부분의 신기술이 그렇지만,  
AI의 날은 양쪽이 훨씬 날카롭고, 우리는 양쪽 모두 잘 이해하지 못한다.

### Good AI

내장된 컴퓨터가 의족 작동을 조정  
→ 자연스러운 의족



자동화된 살상 무기  
Spot Robot with gun

### Bad AI

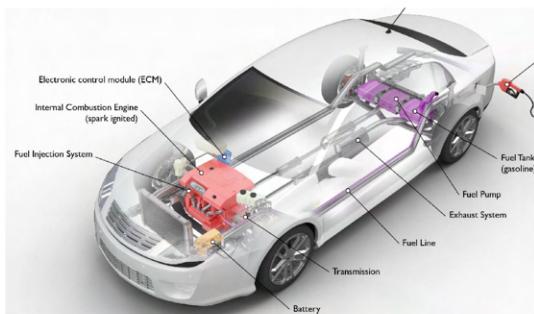


<https://www.mckinsey.com/business-functions/mckinsey-analytics/our-insights/confronting-the-risks-of-artificial-intelligence>

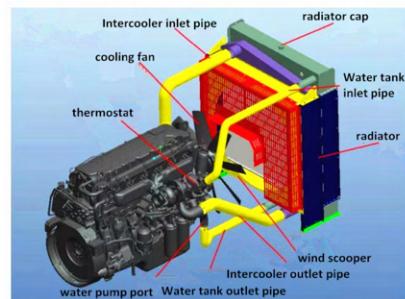
72

## LLM의 약점은 극복해야 할 과제

- LLM 기술의 가치는 확인되었다
- 가솔린 자동차에 냉각장치가 필요했던 것처럼 LLM의 약점을 보완할 장치가 필요



가솔린 자동차 구조



가솔린 자동차의 냉각장치

73

## Super-Large 범용 LM vs Small 특화 LM



Large Language Model

크다	창의적 현상 발현
잦다	환각현상
느리다	학습 및 처리 속도
낮다	설명 가능성
범용성	전문화 가능성
낮다	견고성(Overfitting 가능성)



Small Language Models

적다
적다
빠르다
높다
높다
높다

74

## 현 AI기술의 능력/한계를 알고 사용해야

AI의 결정을 사후 검증할 수 있거나 위험이 적을 때에만 사용해야 !!



- 글쓰기, 그림, 음악, 동영상 제작 등은 → OK
- 추천 시스템 → 심각하지 않은 추천은 OK
- 신약 설계, 신물질 발견 → 사후 검증이 발견 과정의 일부
- 의료진단 → 결정을 보조해주는 지원시스템으로
- 자율자동차 → 상당 기간동안 원격 감시 및 제어기능 필요
- 자동화된 살상 무기 → 절대 NO
- 현장 배치 후에 스스로 학습하는 시스템 → 사람의 개입 필요
- ...

사람과 AI가 한 팀으로 일하는 것이 바람직

75

## ChatGPT 사용의 바람직한 자세

- ChatGPT 등의 AI는 훌륭한 도구일 수 있다. 문제해결에 잘 활용해야
- 일하는 목적, 일하는 방식을 다시 생각해 보자
  - 예 : 교사는 단순 지식전달에서 벗어나 학습코칭, 사회 정서적 멘토링에 집중해야

ChatGPT 활용 준수사항 – 펜실베니아 대학 + 하정우(Naver)

- ChatGPT의 활용 유용성을 판단하고, 아니면 활용하지 말 것
- 올바른 답변을 얻기 위해 질문을 구체적으로, (점진적으로) 고도화 할 것
- 원하는 방향에 대한 예시 알려주기
- 내용이 부족하면 영어로 입력 후 한국어로 번역하기
- 대외비 등 보안이 중요한 내용은 작성 금지
- AI의 답변을 일단 신뢰하지 말고, 다른 자료로부터 사실을 확인(cross-check)할 것
- AI의 답변을 활용할 경우, 이를 명시하고, 답변을 얻기 위한 프롬프트도 함께 명기할 것

**AI의 본질, 능력과 한계를 이해하고  
도구로서 활용하는 능력이 필요하다**





The 6th International Conference on Artificial Intelligence Humanities

## Session 1

### Designing Digital Gender

Moderator: Lucia Siu (HBS-Hong Kong)

Discussion: MinGi Jang (Kyungnam University, Korea)

Seong Il Nam (Dongguk University, Korea)



# **Queering machines**

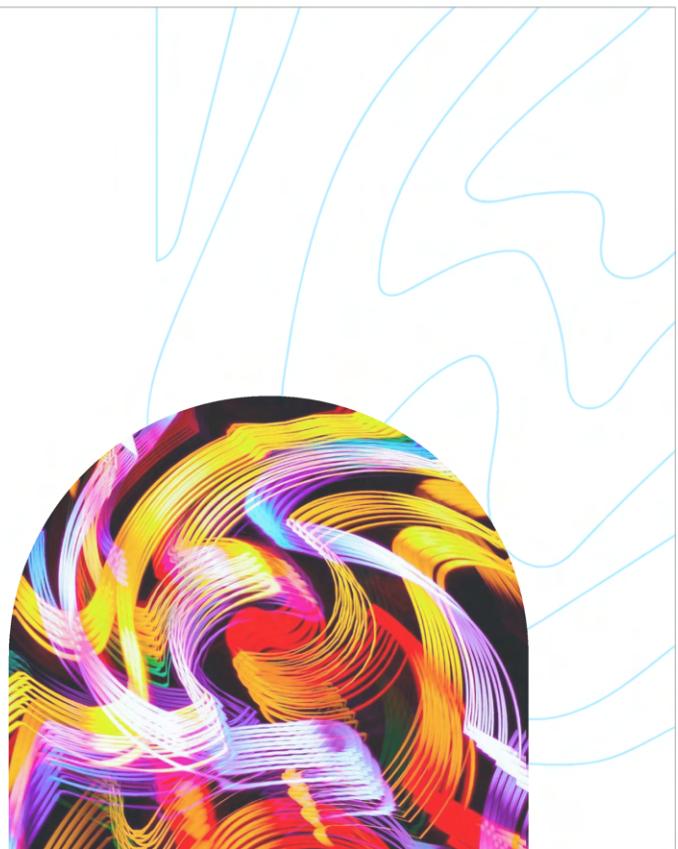
**Adam Poulsen**

**University of Sydney, Australia**



# Queering Machines

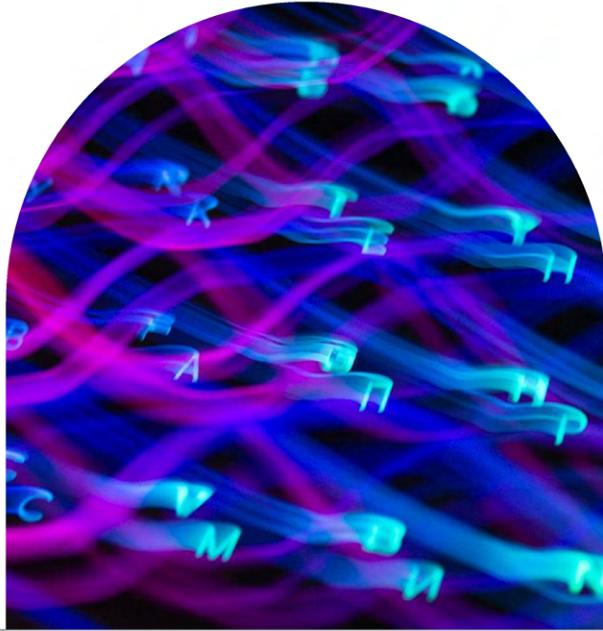
Adam Poulsen  
The University of Sydney



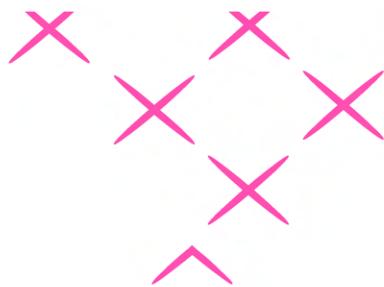
## Focus

Exploring and advancing  
gender and sexual diversity  
in AI and robotics





# Definitions



Sex assigned at birth based on sex characteristics

Gender internal, deeply held sense of one's gender

Sexuality physical, romantic, and/or emotional attraction

Diversity

variety in the representation of individuals

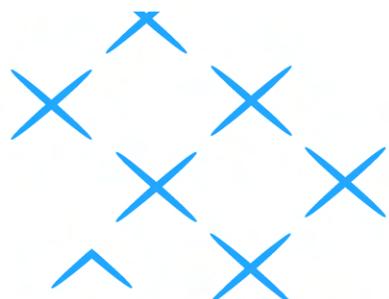
Inclusion

representation of an individual user



Queering  
machines

Exploring and advancing gender and sexual  
diversity in AI and robotics



=

Focus

# Levels of AI and robotics development impacting gender, sex, and sexuality



Technical level



Community level



Target user level





# Technical level

Centring on the diversity of algorithms, techniques, and applications

## Key questions

- Are the algorithms taking into account all the necessary variables?
- Are these algorithms classifying users in discriminatory ways?



## Fighting Hate Speech, Silencing Drag Queens? Artificial Intelligence in Content Moderation and Risks to LGBTQ Voices Online.



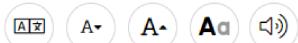
**Authors:** Thiago Dias Oliva, Dennys Marcelo Antonioli and Alessandra Gomes  
**Date:** Apr. 2021



**From:** Sexuality and Culture (Vol. 25, Issue 2)  
**Publisher:** Springer



**Document Type:** Article  
**Length:** 9,731 words  
**DOI:** <http://dx.doi.org/10.1007/s12119-020-09790-w>



### Abstract:

Companies operating [internet](#) platforms are developing [artificial intelligence](#) tools for content moderation purposes. This paper discusses technologies developed to measure the 'toxicity' of text-based content. The research builds upon queer linguistic studies that have indicated the use of 'mock impoliteness' as a form of interaction employed by LGBTQ people to cope with hostility. Automated analyses that disregard such a pro-social function may, contrary to their intended design, actually reinforce harmful biases. This paper uses 'Perspective', an AI technology developed by Jigsaw (formerly Google Ideas), to measure the levels of toxicity of tweets from prominent [drag queens](#) in the United States. The research indicated that Perspective considered a significant number of drag queen Twitter accounts to have higher levels of toxicity than white nationalists. The qualitative analysis revealed that Perspective was not able to properly consider social context when measuring toxicity levels and failed to recognize cases in which words, that might conventionally be seen as offensive, conveyed different meanings in LGBTQ speech.

### EXPLORE

#### More Like This

[LGBTQ+ community stands together after canceled drag queen storytime.](#)  
*UWIRE Text*, Nov. 16, 2019.

[Experts feared attack was likely.](#)  
*USA Today*, Nov. 28, 2022.

[Pride events targeted in surge of anti-LGBTQ threats, violence.](#)  
*Washingtonpost.com*, June 17, 2022.

[View All Related Articles](#)

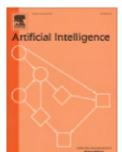


# Community level

Centring on the diversity in the AI and robot development community configuration and technique development stages

## Key questions

- Does the team have enough gender representation?
- Are all the team members from the same background?



ISSN: 0004-3702

## Artificial Intelligence

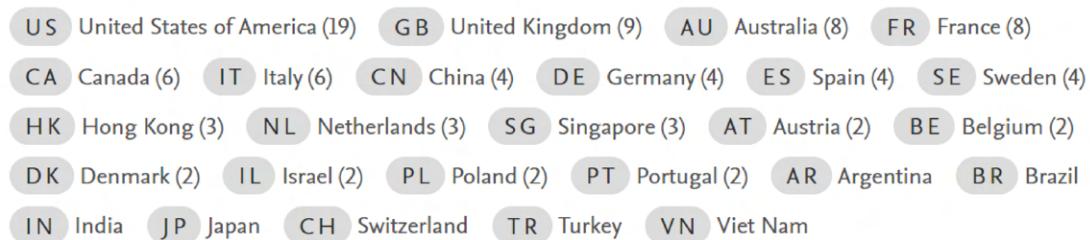
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## Editorial Board

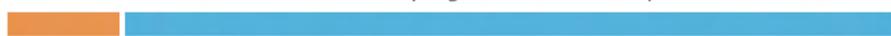
100 editors and editorial board members in 26 countries/regions



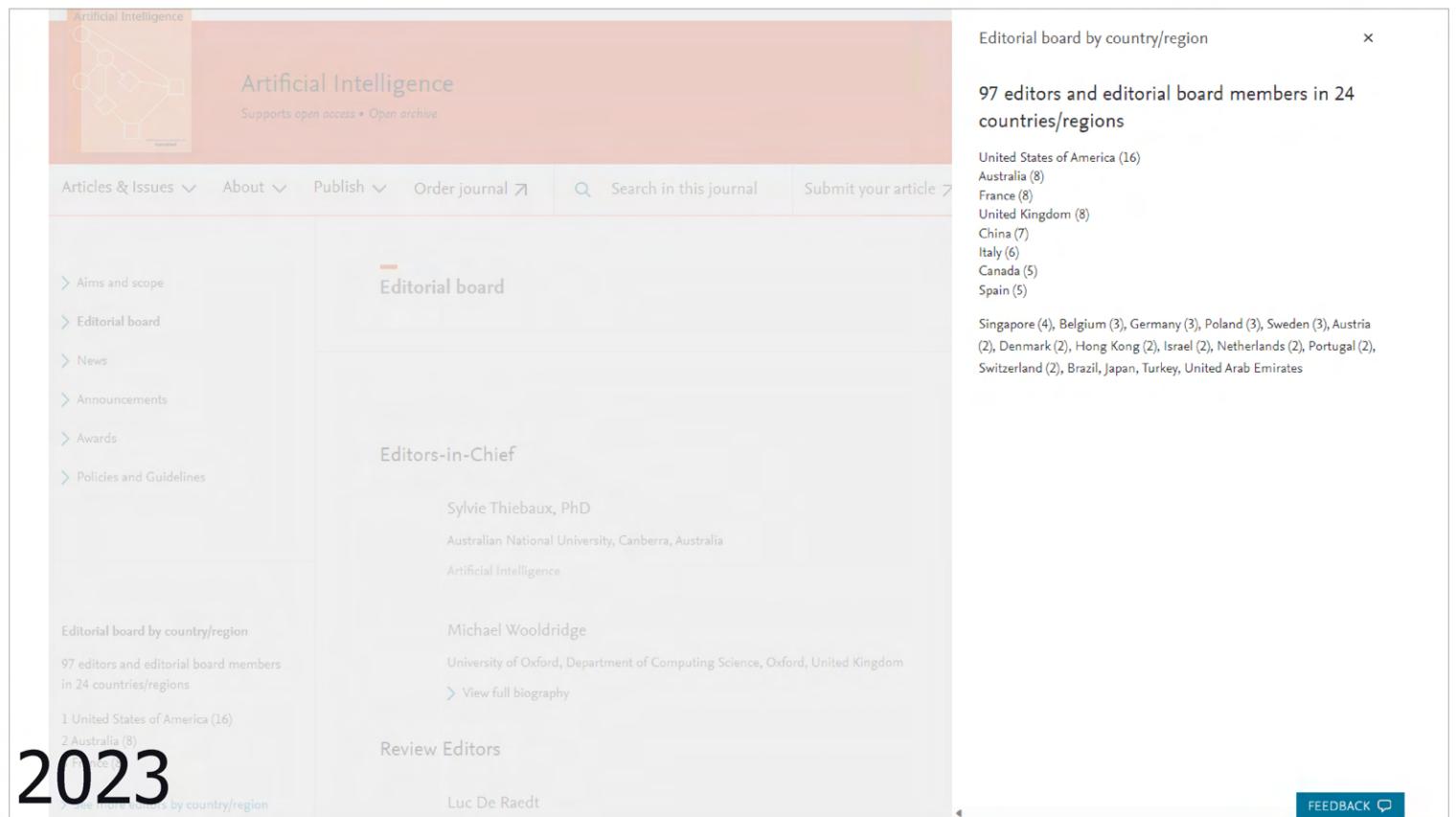
### Gender Diversity Distribution of the Editors ⓘ

Based on 55% responding editors

● 13% woman ● 87% man ● 0% non-binary or gender diverse ● 0% prefer not to disclose



2022



The screenshot shows the homepage of the Artificial Intelligence journal. At the top, there's a navigation bar with links for 'Articles & Issues', 'About', 'Publish', 'Order journal', 'Search in this journal', and 'Submit your article'. On the left sidebar, there are links for 'Aims and scope', 'Editorial board', 'News', 'Announcements', 'Awards', and 'Policies and Guidelines'. Below this is a section titled 'Editorial board by country/region' which lists 97 editors and editorial board members from 24 countries/regions, with the United States of America having 16 members. The main content area features sections for 'Editorial board', 'Editors-in-Chief' (Sylvie Thiebaut, PhD, from the Australian National University, Canberra, Australia), 'Review Editors' (Michael Wooldridge, from the University of Oxford, Department of Computing Science, Oxford, United Kingdom), and 'Luc De Raedt'. A 'Feedback' button is located in the bottom right corner.

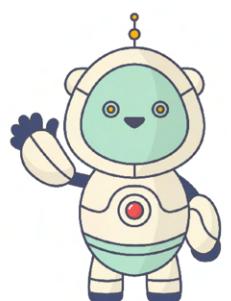


## Target user level

Centring on the diversity of those interacting with, and affected by, AI and robotic systems

### Key questions

- Was the project conducted by taking all the stakeholders into account?
- Did the research include the users for feedback?



# Implications of missing diversity and inclusion in AI and robotics



## Gendered social robots: The mechanization of women



- Singular view of gender
  - Stereotype of perfect womanhood

## Sex robotics: Able-bodied, male-dominated markets



- Often target young, able-bodied, and typically straight men
- Intimate connections with misogyny, child sexual exploitation, male violence, and the idea that women are programmable

## Binary gender classifiers: Guessing objectively what is subjective



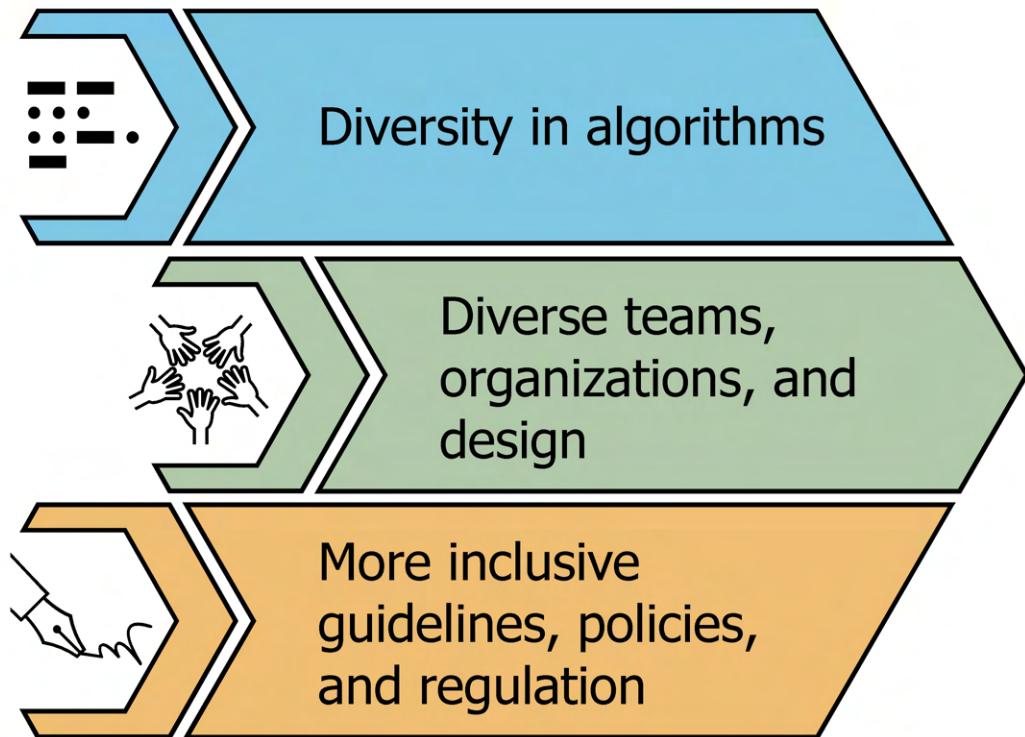
- Masculine and feminine binaries
- Assigning gender to social media users based on stereotypical characteristics (e.g., feminine words used online = female user)

# Algorithms for medical applications: Gender as a safety parameter

- Failing to account for diverse gender and sexuality considerations risks patient safety and healthcare outcomes
- AI systems explicitly exclude minority groups in society like the transgender and the intersex communities

Addressing  
diversity and  
inclusion in AI  
and robotics





## Diversity in algorithms

- Greater diversity and inclusion in **datasets** used in AI-driven medicine and social media
- Increased use of gender-neutral **biomarkers** could also be used in AI decision-making

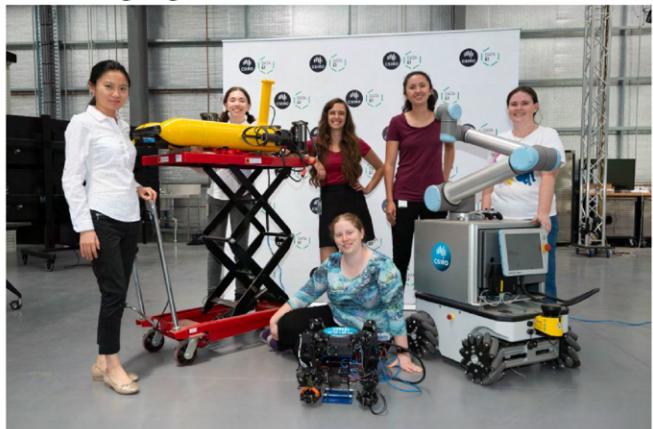


# Diverse teams, organizations, and design

- Diverse groups have more accurate discussions, cite more facts, make fewer mistakes, and are more willing to discuss sensitive topics such as racism – outperforming homogeneous groups
- Participatory design is crucial to better account for the values, needs, and expectations of vulnerable communities



**Pride@CSIRO** is a professional network and social community for LGBTQI+ identifying employees and allies. The network promotes and drives the inclusion of LGBTQI+ employees by raising awareness, supporting peers and challenging discrimination.



## Fluid Sex Robots: Looking to the 2LGBTQIA+ Community to Shape the Future of Sex Robots

Skyla Y. Dudek ; James E. Young [All Authors](#)

### Abstract:

As sex robots continue to be developed by industry, portrayed by media, and studied by researchers, it is common to conceptualize robots from a cisgender and heterosexual (cishet), or feminist perspective. We advocate for an increased shift toward the 2LGBTQIA+ community for inspiration and a path forward for more inclusive, successful, and socially responsible sex robots. In addition to the intrinsic value of being inclusive, looking to the 2LGBTQIA+ community can help us to break away from traditional ideas of gender and sexuality, to unlock the full potential of this technology to be flexible and offer new possibilities. Further, we reflect on the importance of considering how the designs of sex robots, as politically charged technological artifacts, can contribute to reinforcing ideas about heteronormativity; instead, sex robots have the potential to positively contribute to breaking down traditional barriers surrounding gender and sex. We envision a future of sex robots that reach their full potential as fluid, individualized companions that enable people to comfortably engage their interests and identity.

## More inclusive guidelines, policies, and regulation

- Improved guidance for AI and robot developers to implement human rights and diversity in their **teams** or their system **designs**
- Relevant **human rights** - EU Charter of Fundamental Rights, Art. 1 on dignity, 21 on non-discrimination, 23 on equality between women and men



# Analysis of Gender Stereotypes for the Design of Service Robots: Case Study on the Chinese Catering Market

Authors:  [Zixuan Wang](#),  [Jiawen Huang](#),  [Costa Fiammetta](#) [Authors Info & Claims](#)

DIS '21: Designing Interactive Systems Conference 2021 • June 2021 • Pages 1336–1344 • <https://doi.org/10.1145/3461778.3462087>

## ABSTRACT

Service robots are entering all kinds of business areas, and the outbreak of COVID-19 speeds up their application. Many studies have shown that robots with matching gender-occupational roles receive larger acceptance. However, this can also enlarge the gender bias in society. In this paper, we identified gender norms embedded in service robots by iteratively coding 67 humanoid robot images collected from the Chinese e-commerce platform Alibaba. We then generated four-step guidance for designers to identify and challenge the gender norms in the robot design. Our research provides both the fundamental grounding and practical guidance for designing catering robots that challenge gender norms and promote social equality.

# Accounting for Diversity in Robot Design, Testbeds, and Safety Standardization

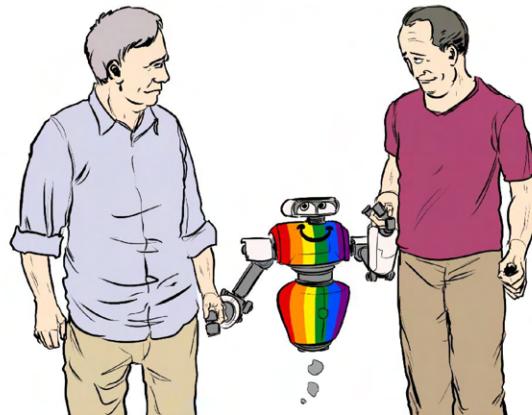
[Eduard Fosch-Vilaronga](#)  & [Hadassah Drukarch](#)

[International Journal of Social Robotics](#) (2023) |

Robot policy ecosystems are also oblivious to the vast landscape of gender identity understanding, often ignoring these considerations and failing to guide developers in integrating them to ensure they meet user needs. While this ignorance may be for the traditional heteronormative configuration of the medical, technical, and legal world, the ending result is the failure of roboticists to consider them in robot development. However, missing diversity, equity, and inclusion considerations can result in robotic systems that can compromise user safety, be discriminatory, and not respect their fundamental rights. This paper explores the impact of overlooking gender and sex considerations in robot design on users. We focus on the safety standard for personal care robots ISO 13482:2014 and zoom in on lower-limb exoskeletons.

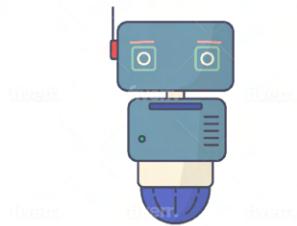
# Going forward: Queering machines

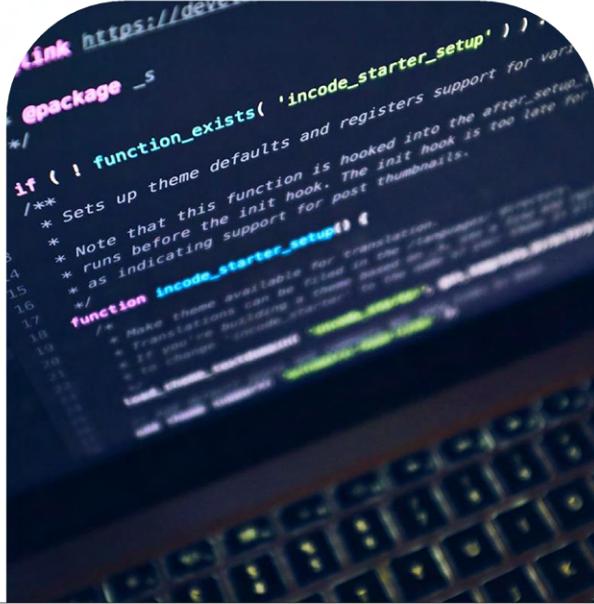
- 1 Further consideration of gender and sexuality is needed in AI and robot design and development, team configuration, and target user groups



# Going forward: Queering machines

- 2 Diversity and inclusion strategies are necessary, including:
- reducing stereotypes in algorithms, creating diverse development teams, and improving AI and robot developer guidelines





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adam.poulsen@sydney.edu.au

# **Who do robots love?**

**: A critical exploration of the relationship  
between gender binaries and robotics**

**Katharina Klappheck**

**Gunda Werner Institute, Germany**



# Who do robots love?

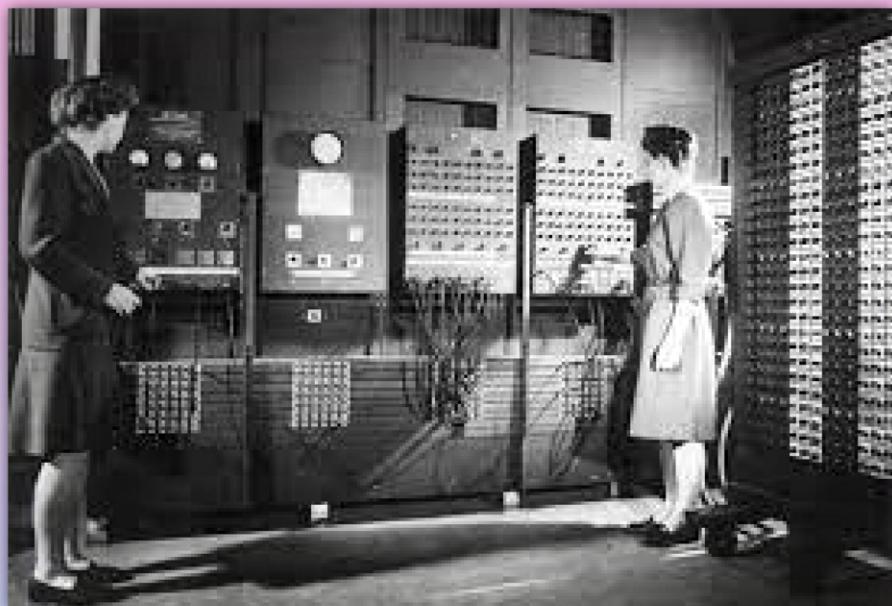
A critical exploration of the relationship between gender binaries and robotics

## Theses

- Work within robotics is gendered
  - This gendered work establishes norms about gender, sexuality, race and class.
  - These norms are part of the narrative about robotics in the global north.
  - Alternative stories and feminist perspectives could be a possibility for more social justice in this field

# Same Old Stories?

A classic view on the history of robotics in the case of gender inequality







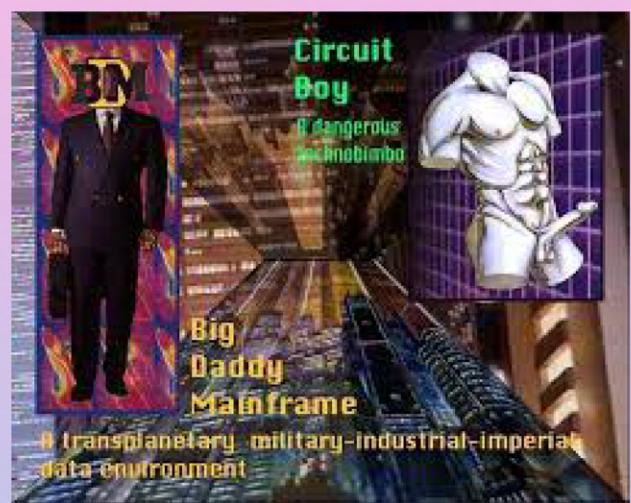
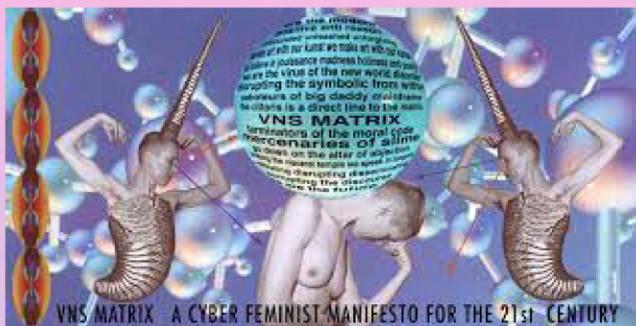
## Theoretical Finding

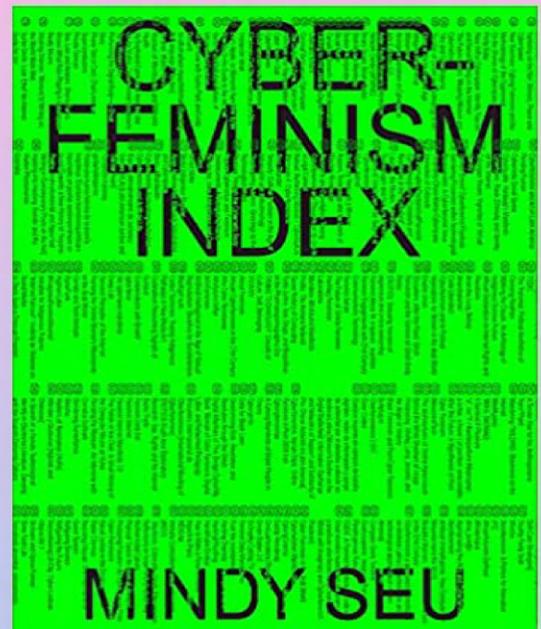
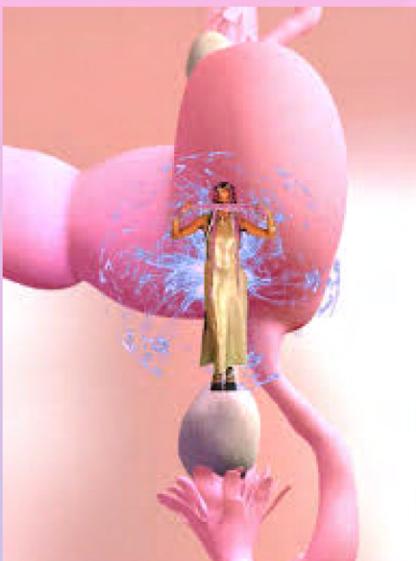
- Work in the context of robotic is a very narrow concept (Forsythe 2001, 33-34).
  - Often office work is not seen as real work (Forsythe 2002, S. 169-173)
- Women are actively prevented from participating (Adam 1998, S.45-46; Suchman 2007, S.200-2005, Myers West 2020, S. 11)
- The Field of robotics is white/male. (Klein, D'Ignazio 2020, S.27).
  - Over decades
  - In the private and public sector



# Dreamland...

New perspectives on old problems







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*“of bodies new and strange”*

: cross disciplinary perspectives on our  
human machine relationships

Aifric Campbell

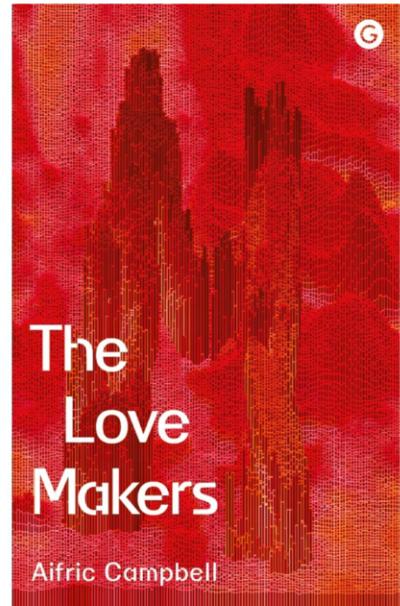
Imperial College London, UK



*'of bodies new and strange':*  
cross disciplinary perspectives on our  
human machine relationships

Dr Aifric Campbell  
Imperial College London  
June 2 2023

[aifric.campbell@imperial.ac.uk](mailto:aifric.campbell@imperial.ac.uk)



DRAFT SUMMARY KEY TOPICS

©Dr Aifric Campbell

## Our technological seduction

Are emergent technologies redefining what we understand as love, attachment and desire?



*'What is to be the future of feeling?' - J.D. Bernal, 1924*

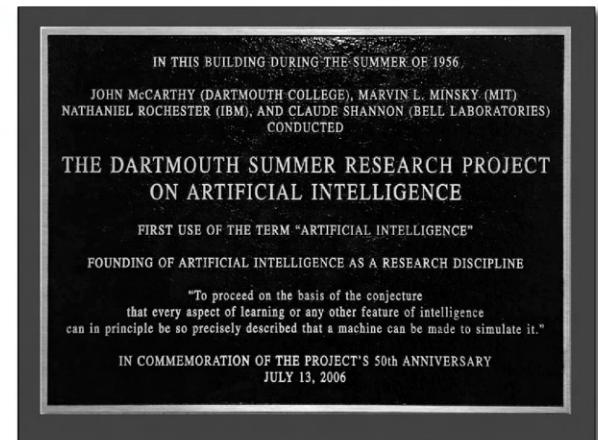
'From robot nannies to generative art and our ancient dreams of intelligent machines, *The Love Makers* blends storytelling with science communication to investigate the challenges and opportunities of emergent technologies and how we want to live.'

<https://mitpress.mit.edu/978191268584>

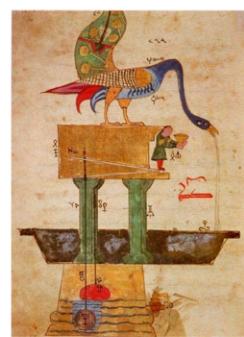


## It didn't all start at Dartmouth!

### DARTMOUTH CONFERENCE: THE FOUNDING FATHERS OF AI, 1956



'of bodies new and strange': the history of dream, desire, invention...



## Our technological seduction: historical context

Power, consent, surveillance, privacy, representation - our hopes, dreams, fears and anxieties about intelligent machines were foreshadowed by the ancients.

alfric campbell

2,160 Tweets

E.R.Truitt essay in *The Love Makers*

You Retweeted

MIT Press @mitpress · Nov 24, 2021

Artificial servants, autonomous killing machines, surveillance systems, and sex robots have been part of the human imagination for thousands of years. [@GoldsmithsPress](http://bit.ly/3nLOWIU)



[thereader.mitpress.mit.edu](http://thereader.mitpress.mit.edu)

Surveillance, Companionship, and Entertainment: The Ancient History...

Artificial servants, autonomous killing machines, surveillance systems, and sex robots have been part of the human imagination for thousand...

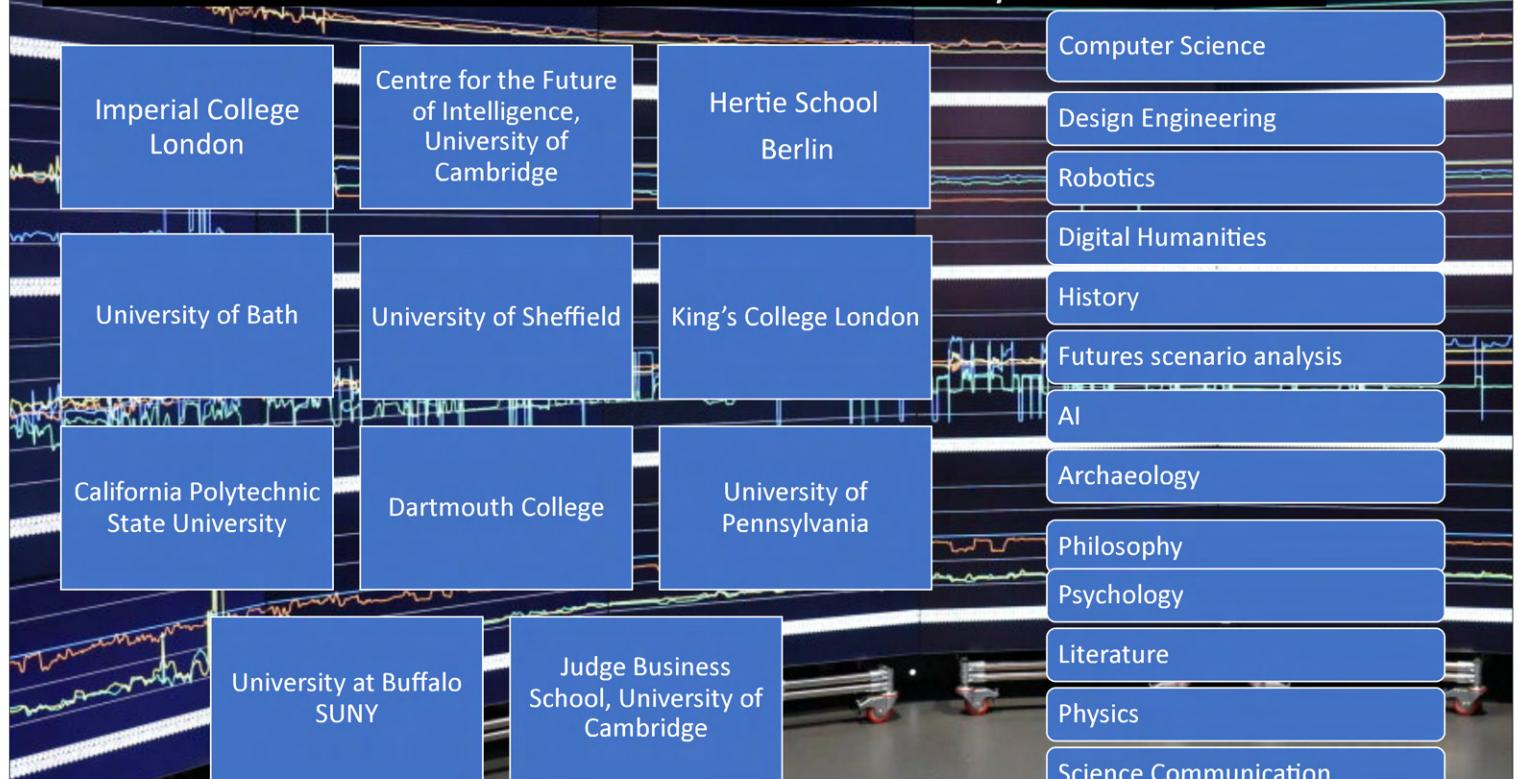
## Cross-disciplinary collaborations: AHSS (Arts, Humanities, Social Sciences) + STEMM

**Topic:** how AI & robotics are/will/may transform the future of love, attachment and desire  
**Mission:** public engagement in AI and robotics  
**Objective:** inform, entertain, provoke & empower debate  
**Form:** fiction+ contributor essays + poetry + code generated artwork  
**Themes:** Representation & inclusivity, women in tech, female friendship, seduction behaviours  
**Process:** creative collaborations with academics stakeholders in bioengineering, mathematics, design engineering, electrical engineering, AI, robotics, science communication

‘We need more  
interdisciplinarians [in AI]’  
- Andrew Blake, Turing  
Institute, 2018

‘We need loud conversation in cafes  
and bars’  
– Anders Sandberg, FHI, University  
of Oxford, 2016

## Scientists & scholar contributors to *The Love Makers* by institution & field



## Our technological seduction: definition



LATIN: SEDUCERE

15th C (persuade soldiers ) to abandon their duty'); from *SE-* 'away, apart' + *DUCERE* 'to lead'

Seduction: a force that leads us away and propels/ pushes us towards something/one....

*Further topics:*

Storytelling as sensemaking

Seduction behaviours

Attachment: the pathway to intimacy

Representation & design

The future of humanlove



Bryson & Bogani  
in *The Love Makers*

...

A machine can't love our children, but our children might love them.



wired.com

The Future of Robot Nannies

A machine can't love our children, but our children might love them.

4:56 AM · Dec 18, 2021 · SocialFlow

©Dr Aifric Campbell

The 6th International Conference on Artificial Intelligence Humanities

## Session 2

### AI, Communication, and Reality

Moderator: Rosemary Moon (Hansung University, Korea)

Discussion: Bora Kang (Yonsei University, Korea)

Yune Jung Kim (Duksung Women's University, Korea)



# **Augmentation or substitution?**

## **The role of generative AI in human labor**

**Ahram Moon**

Korea Information Society Development Institute, Korea



# Augmentation or substitution? : The role of generative AI in human labor

Ahram Moon | Research Fellow  
Center for AI and Social Policy  
Korea Information Society Development Institute

## Overview

### Augmentation or Substitution?

A generative AI advances; it's important to understand its impact on human labor. Will it augment or substitute human workers? Let's explore.

by Ahram Moon

### The Labor Market: AI and Labor Productivity

**Job Displacement**

On the other hand, the use of AI can lead to the displacement of certain jobs, especially those that require no cognitive skills.

**Productivity and Efficiency**

AI can enhance the productivity and efficiency of workers by taking over repetitive and tedious tasks.

**Skills Based Jobs**

Workers who possess advanced cognitive skills, like problem solving and creativity, will remain in demand even with the emergence of AI systems.

### Impact on Cognitive Tasks: Generative AI and Knowledge Workers

**Advantages of Generative AI**

Generative AI can assist AI workers get more done in less time, and can analyze large volumes of data more quickly than a human.

**The Role of a Human Worker**

A human worker's role will shift from executing tasks to supervising the AI and applying their cognitive skills to make high-level decisions.

### Task Automation: What Jobs Are on the Line?

As automation becomes more advanced, jobs that were once considered safe are now at risk. But which jobs are the most vulnerable? In this card, we'll explore the different types of tasks that can be automated, and what that means for the future of work.

### Algorithmic Management: The Future of Work?

**Algorithmic Management**

Algorithmic management uses AI to monitor, control, and manage work activities and decisions, with the goal of improving performance and outcomes.

**Pros and Cons**

Algorithmic management can help organizations increase efficiency, but can also lead to reduced job satisfaction and morale.

**Human Oversight**

Human oversight is essential for ethical use of algorithmic management, creating balance between humans and AI for optimal outcomes.

### Radical Evolution: Meet the Digital Intelligent Worker

**Digital Intelligent Worker**

The digital intelligent worker is a worker who can collaborate with AI. As AI evolves, workers will continuously evolve new skills and abilities.

**Brain-Machine Interface**

The next phase of human labor evolution could involve a direct connection between the human brain and machines, allowing the brain to control physical tasks in digital ones.

**Co-Bots**

Robots and humans working together in the same space can improve efficiency, reduce errors, and increase output.

### The Basics: Understanding AI and Task Automation

**What is AI?**

Artificial intelligence uses algorithms that allow computers to perform tasks that require human-like thinking.

**Task Automation**

Automating tasks that can save time and increase efficiency, but it can also lead to job displacement.

**Generative AI**

Generative AI is a subset of AI that can create original content, such as text and images, without human help.

### How Generative AI is Boosting Productivity in the Workplace

Generative AI is revolutionizing the way we work, allowing us to automate complex tasks and augment human decision-making. In this card, we'll explore how generative AI is being used in different industries to improve productivity and efficiency, and what this means for the future of work.

### The Human and AI Collaboration

**Human Input**

Humans are and will continue to integrate the AI learning process by providing input and feedback to improve AI performance and relevance.

**AI Assistance**

AI can provide assistance to workers in real-time, offering guidance and solutions to problems, and enhancing overall productivity.

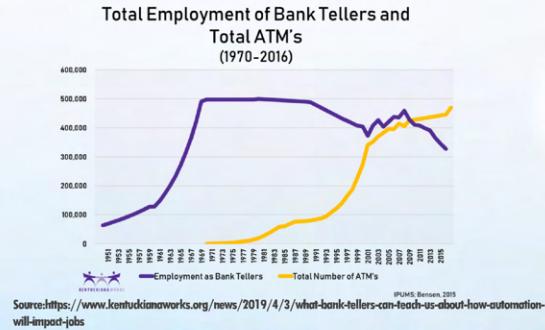
**Future Opportunities**

As AI technology continues to advance, there will be numerous opportunities to blend human and AI capabilities to solve complex problems and achieve new levels of innovation.

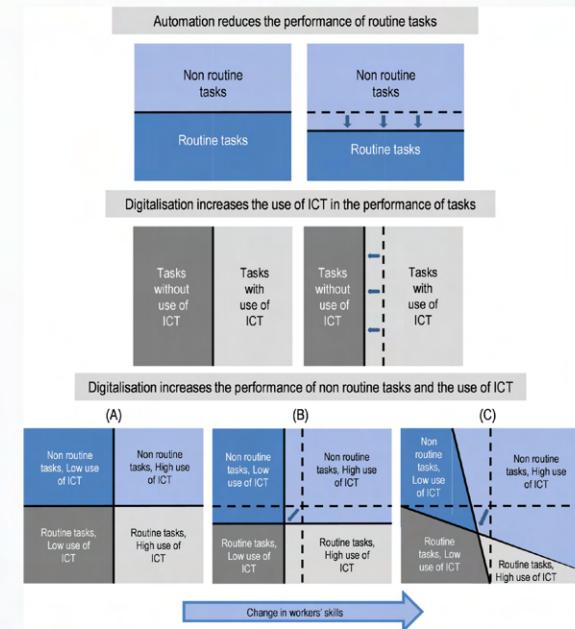
## Substitution or complements?

### ✓ Technology transforms occupations

- Complementarity effect: Technology enables workers to do tasks such as searching for information or communicating with colleagues or clients – differently and perhaps more efficiently. An increasing share of workers doing problem-solving and communication tasks use ICT tools on the job.
- A substitution effect: Technology replaces workers in the performance of some tasks that can be automated. As routine tasks are easier to automate, the substitution effect decreases the routine intensity of jobs.



### Digitalization on tasks performed on the job



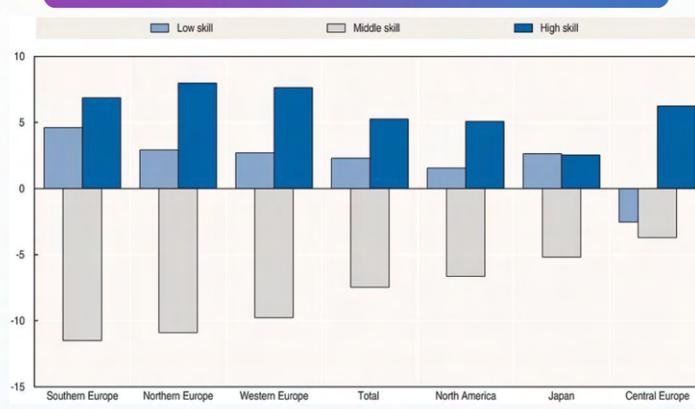
Source: OECD Skills Outlook(2019) figure 2.4

## Conventional framework

### ✓ From skill-biased to routine-biased technological change

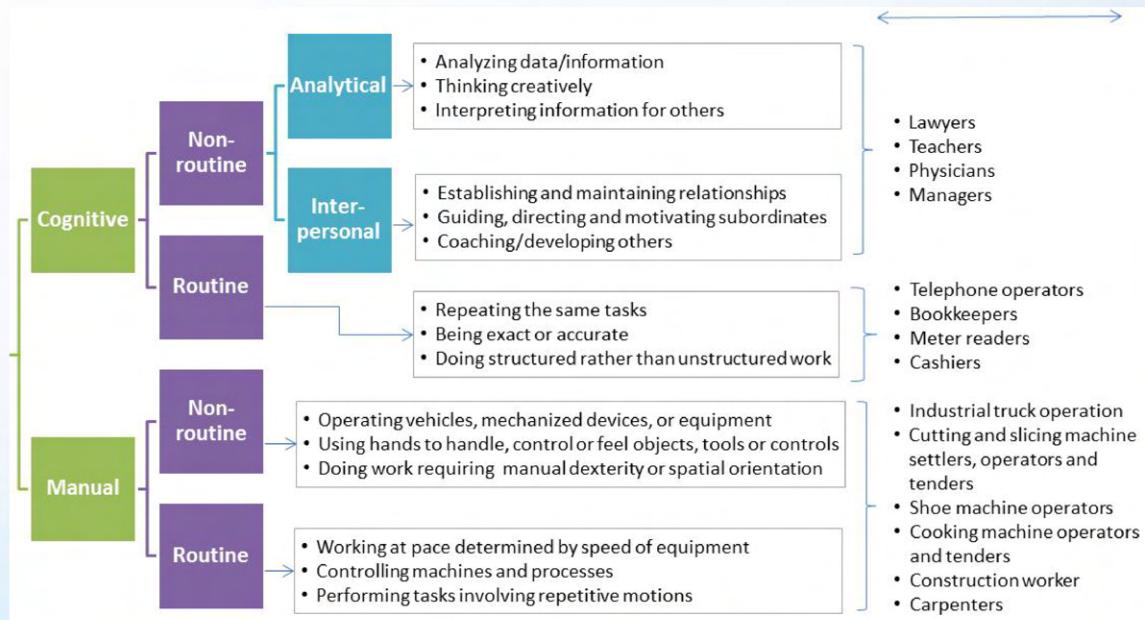
- Job polarization : hollowing out of middle-class jobs  
Decline in the employment share of middle-skilled workers and an increase in the employment share of low-skilled and high-skilled workers
- ALM Hypothesis (Autor, Levy, and Murnane (2003), Goos and Manning(2003))  
Technology can replace human labor in routine tasks, be they manual or cognitive, but (as yet) cannot replace human labor in non-routine
- Technology is advancing in a way that replaces routine tasks, and these routine tasks are primarily performed by middle-skilled workers.

### Labor market polarization



**Automation replaces the tasks that make up the job rather than replacing entire jobs**

## Occupation, task, and work activity



Source: Aedo et al.(2013), World Bank Working Paper "From Occupations to Embedded Skills" Fig 1; generated based on descriptions in O'Net, Autor, Levy and Murnane (2003) and Acemoglu and Autor (2010)

## Task automation

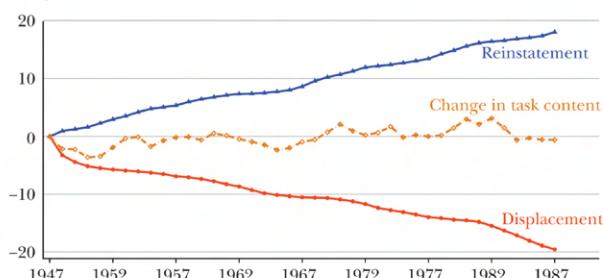
### Displacement and reinstatement effects

- Job task displacement by technology has outpaced job task reinstatement since the mid-1980s (Acemoglu and Restrepo, 2019)
  - (Displacement effect occurs when capital takes over tasks previously performed by labor)
  - (Reinstatement effect occurs when technologies create new tasks in which labor has a comparative advantage)

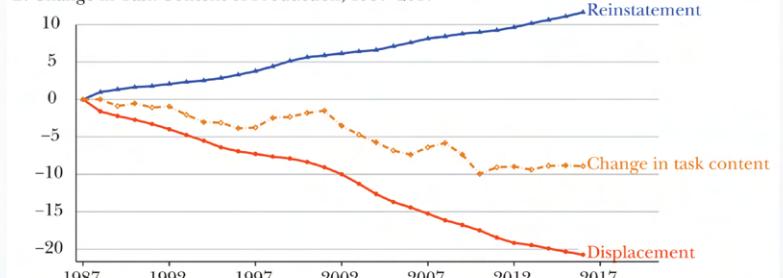
#### So-so technology

### Labor share output and change in task content

B: Change in Task Content of Production, 1947–1987



B: Change in Task Content of Production, 1987–2017



Source: Acemoglu and Restrepo (2019), Automation and New Tasks : How technology displaces and reinstates labor

# Understanding AI and task automation

## Approaches to understand AI capability and tasks in occupations

### Automation potential for occupations

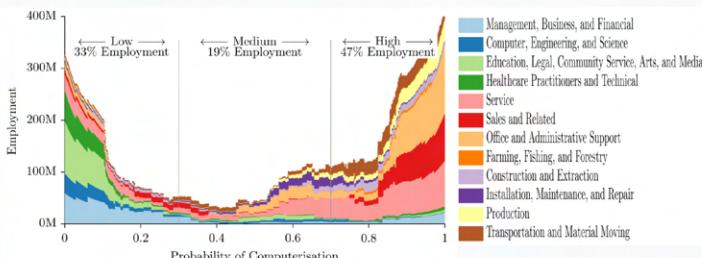
(Frey and Osborne, 2017) Labeling automation potentials from US occupations and estimate this potential for all other occupations; 47% potential

### Considering each job as a bundle of tasks.

(McKinsey, 2017) Categorize more easily automatable work activities across occupations and estimate this potential for occupations: Nearly all occupations will be affected by automation, but only about 5 percent of occupations could be fully automated by currently demonstrated technologies. Many more occupations have portions of their constituent activities that are automatable: we find that about 30 percent of the activities in 60 percent of all occupations could be automated."

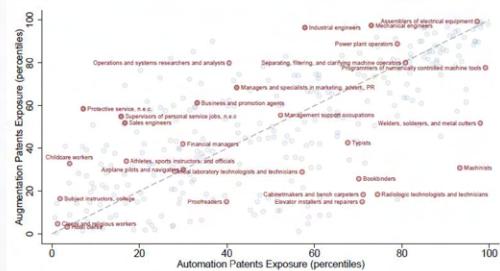
### Augmentation and automation (Autor et al, 2022)

#### Automation potential for occupation



Source: Frey and Osborne, 2017

#### Automation and augmentation



Source: Autor et al, 2022

# Understanding AI and task automation

## Approaches to understand AI capability and tasks in occupations

### Considering each job as a bundle of tasks.

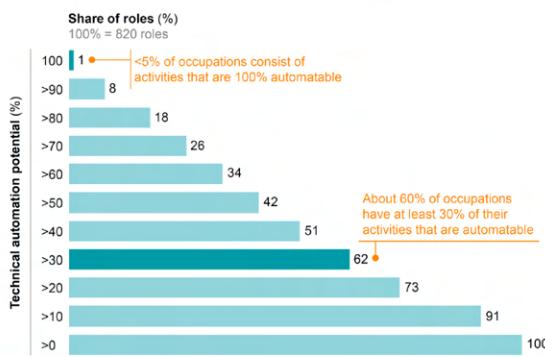
(McKinsey, 2017) Categorize more easily automatable work activities across occupations and estimate this potential for occupations: Nearly all occupations will be affected by automation, but only about 5 percent of occupations could be fully automated by currently demonstrated technologies. Many more occupations have portions of their constituent activities that are automatable: we find that about 30 percent of the activities in 60 percent of all occupations could be automated."

### While few occupations are fully automatable, 60 percent of all occupations have at least 30 percent technically automatable activities

Automation potential based on demonstrated technology of occupation titles in the United States (cumulative)<sup>1</sup>

#### Example occupations

Sewing machine operators, graders and sorters of agricultural products
Stock clerks, travel agents, watch repairers
Chemical technicians, nursing assistants, Web developers
Fashion designers, chief executives, statisticians
Psychiatrists, legislators



Source: McKinsey (2017), A future that works: Automation, employment, and productivity  
McKinsey (2015), Four fundamentals of workplace automation

#### Occupations

Retail salespeople	Greet customers
Food- and beverage-service workers	Answer questions about products and services
Teachers	Clean and maintain work areas
Health practitioners	Demonstrate product features
	Process sales and transactions

~800 occupations

#### Activities (retail example)

Greet customers
Answer questions about products and services
Clean and maintain work areas
Demonstrate product features
Process sales and transactions

~2,000 activities assessed across all occupations

#### Capabilities

Social
Social and emotional sensing
Social and emotional reasoning
Emotional and social output

#### Cognitive

Understanding natural language
Generating natural language
Retrieving information
Recognizing known patterns/categories (supervised learning)
Generating novel patterns/categories
Logical reasoning/problem solving
Optimizing and planning
Creativity
Articulating/displaying output
Coordinating with multiple agents

#### Physical

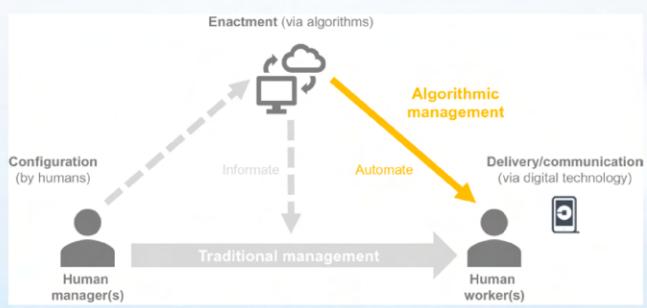
Sensory perception
Fine motor skills/dexterity
Gross motor skills
Navigation
Mobility

# Algorithmic management

KISDI 정보통신정책연구원  
Korea Information & Society Development Institute

## Algorithmic management

- The use of computer-programmed procedures for the coordination of labor input in an organization
- Ex: Algorithmic control in the gig platform economy



Source: ILO(2022), The Algorithmic Management of work and its implications in different contexts

## Classification of levels of automation in algorithmic management

(Original proposal by Alex Wood, 2021)

Level of automation	Narrative definition	Direction Evaluation Discipline	Review (in case of system failure)	Human can overrule system
1. No automation	Full-time performance by human manager of all aspects of direction, evaluation and discipline	Human manager	Human manager	n/a
2. Mgmt. assistance	Assistance in either direction, evaluation or discipline with the expectation that human managers perform other management tasks and use own judgement to review, ignore and overrule system	Human manager and algorithm	Human manager	Yes
3. Partial automation	Mode specific execution of either direction, evaluation or discipline with the expectation that human managers perform remaining functions	Human manager or algorithm	Human manager	Yes
<i>Algorithmic management</i>				
4. Conditional automation	Mode specific execution of direction, evaluation and discipline with the expectation that human managers will respond appropriately to a request to intervene	Algorithm	Human manager	Yes
5. High automation	Full-time performance by an algorithmic system of direction, evaluation and discipline without the need for human managers to intervene	Algorithm	Algorithm	Yes
6. Full automation	Full-time performance by an algorithmic system of direction, evaluation and discipline without the possibility for human managers to intervene	Algorithm	Algorithm	No

Source: ILO(2022), The Algorithmic Management of work and its implications in different contexts

# Algorithmic management

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Korea Information & Society Development Institute

## The role of AI in algorithmic management : Amplifying principle-agent setting

- When the principal is imperfect to observe the agent's effort, the agent have the bargaining power
- But algorithmic management make the agent activities perfectly observable
- Principals are more likely to penalize workers instead of giving incentives

## Impacts of algorithmic management

- More effective and efficient work process
  - : supporting workers, increasing productivity and ensuring work safety
- Less job quality: paid work to unpaid work
  - : work intensification, worsening of working time quality, increasing hidden working hours, job insecurity loss of autonomy and deskilling, additional cost
- Ethical challenges



Source: <https://atelier.net/insights/one-more-run-algorithms-impact-gig-workers>

# What is Generative AI

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## ✓ Generative AI

- AI models or applications (such as ChatGPT) that can be used to create new content, including audio, code, images, text, simulations, and videos.
  - training an artificial neural network (an algorithm modeled after the structure of a human neuron) using a large data set
  - adjust parameters to create a generative AI model
  - Instruction tuning or reinforcement learning from human to produce better results

## ✓ Generative AI tools in workplace

- Writing assistants tend to dominate for work since those are easy to create using the large language model

The image shows three separate screenshots of AI writing tools:

- Jasper**: A dark-themed interface with a purple header. It features the title "The Future Of Writing Marketing Copy." and a subtext: "Artificial intelligence makes it fast & easy to create content for your blog, social media, website, and more! Rated 5/5 stars in 3,000+ reviews." A "Get started →" button is at the bottom.
- Gamma**: A white-themed interface with a purple header. It features the title "A new medium for presenting ideas. Powered by AI." and a subtext: "Just start writing beautiful, engaging content with none of the formatting and design work." A "Sign up for free" button is at the bottom.
- MS 365 copilot**: A screenshot of a Microsoft Word document window. A floating sidebar titled "Create content with Copilot" contains the text "draft a proposal from yesterday's [meeting notes]".

**Feature** A smart writing creator that helps keep workers on-brand for external content

**Feature** AI-powered tool for creating PowerPoint presentations.

**Feature** AI-assisted content creation and contextual user data-powered business chatbots.

# Generative AI

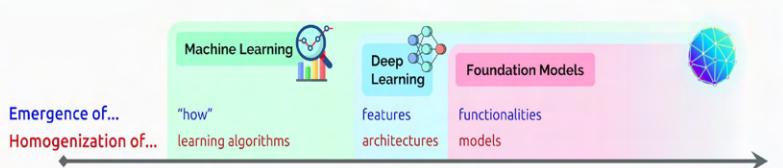
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## ✓ Stanford HAI (2022)

- Increasing emergence and homogenization

Emergence: the behavior of a system is implicitly induced rather than explicitly constructed

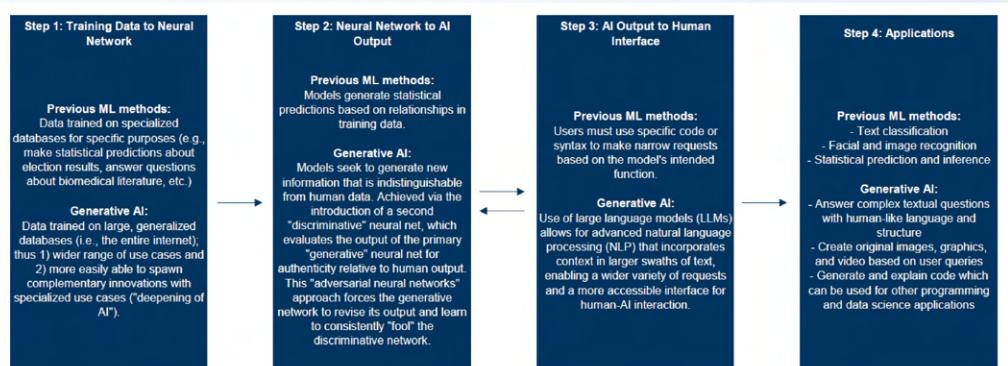
Homogenization: the consolidation of methodologies for building machine learning systems across a wide range of applications



Source: Stanford HAI(2021) On the Opportunities and Risks of Foundation Model

## ✓ Goldman Sachs (2023)

- Generalized rather than specialized
- Generative rather than descriptive
- Approachable rather than technical



Source: Goldman Sachs(2023)

# Generative AI and task

## Tasks of Generative AI exposed

- ❖ Generative new content
- ❖ Communicate between human and machines

Label	Standard	Examples of Tasks
Direct exposure	if direct access to the LLM through an interface like ChatGPT or the OpenAI playground alone can reduce the time it takes to complete the task with equivalent quality by at least half.	- Writing and transforming text and code according to complex instructions, - Providing edits to existing text or code following specifications, - Writing code that can help perform a task that used to be done by hand, - Translating text between languages, - Summarizing medium-length documents, - Providing feedback on documents, - Answering questions about a document, - Generating questions a user might want to ask about a document, - Writing questions for an interview or assessment, - Writing and responding to emails, including ones that involve refuting information or engaging in a negotiation (but only if the negotiation is via written correspondence), - Maintain records of written data, - Prepare training materials based on general knowledge, or - Inform anyone of any information via any written or spoken medium.
Exposure by LLM-powered applications	if having access to the LLM alone may not reduce the time it takes to complete the task by at least half, but it is easy to imagine additional software that could be developed on top of the LLM that would reduce the time it takes to complete the task by half	- Summarizing documents longer than 2000 words and answering questions about those documents, - Retrieving up-to-date facts from the Internet and using those facts in combination with the LLM capabilities, - Searching over an organization's existing knowledge, data, or documents and retrieving information, - Retrieving highly specialized domain knowledge, - Make recommendations given data or written input, - Analyze written information to inform decisions, - Prepare training materials based on highly specialized knowledge, - Provide counsel on issues, and - Maintain complex databases.
Exposure given image capabilities	if there is a significant reduction in the time it takes to complete the task given access to a LLM and these image capabilities	-Reading text from PDFs, - Scanning images, or - Creating or editing digital images according to instructions
No exposure	if none of the above clearly decrease the time it takes for an experienced worker to complete the task with high quality by at least half	- If a task requires a high degree of human interaction (for example, in-person demonstrations), - If a task requires precise measurements, - If a task requires reviewing visuals in detail, - If a task requires any use of a hand or walking, - If any part of the task involves collecting inputs to make a final decision (as opposed to analyzing data to inform a decision or make a recommendation), - If using those tools would not save an experienced worker significant time completing the task.

Source: Eloundou et al.(2023), GPTs are GPTs: An Early Look at the Labor Market Impact Potential of Large Language Models

# Generative AI and task

## Most AI-exposed work activities

- Getting information, ● Monitoring Process materials, or surroundings, ● Identifying objects, actions, and events, ● Estimating the Quantifiable Characteristics of Products, Events, or Information, ● Processing information, ● Evaluating information to determine compliance with standards, ● Analyzing data or information, ● Updating and using relevant knowledge, ● Scheduling work and activities, knowledge, ● Organizing, planning and prioritizing work, ● documenting/recording information, ● interpreting the meaning of information for others, ● performing administrative activities

AI exposed work activities	Example of Automation	Examples of Tasks by Difficulty
Getting Information	Web scrape data from online sources and consolidate into a clean dataset; conduct and summarize a review of prior research based on a textual query and answer follow-up questions	2: Follow a standard blueprint 4: Review a budget 6: Study international tax laws
Estimating the Quantifiable Characteristics of Products, Events, or Information	Produce market size estimates based on assumptions grounded in existing research; estimate parameters using statistical modeling on input data and select optimal model2:	2: Estimate the size of household furniture to be shipped 4: Estimate transportation delays from inclement weather 6: Estimate the size of resource deposits beneath the world's oceans
Updating and Using Relevant Knowledge	Draft and update reports in corporate knowledge base; update statistical and financial models based on new data which challenges prior scenarios/assumptions2	2: Track price changes in a small retail store 4: Track changes in maintenance procedures for repairing SUVs 6: Learn information about a complex and rapidly-changing technology
Interpreting the Meaning of Information for Others	Explain the structure and function of code or statistical results in easy-to-understand language; translate code and text between languages; summarize and contextualize text with technical jargon	1: Interpret a blood pressure reading 4: Interpret how foreign tax laws apply to U.S. exports 6: Interpret a complex experiment in physics for general audiences

Source: Goldman Sachs(2023)

## Generative AI and productivity

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Exhibit 9: Academic Studies Generally Find That AI Adoption Increases Within-Firm Annual Worker Productivity Growth by 2-3pp

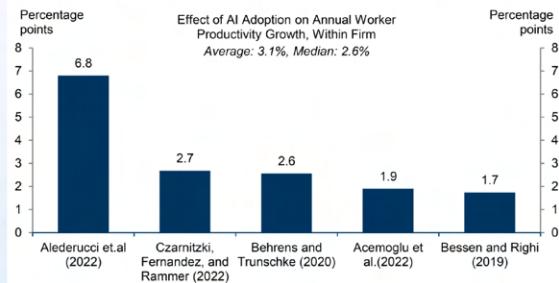
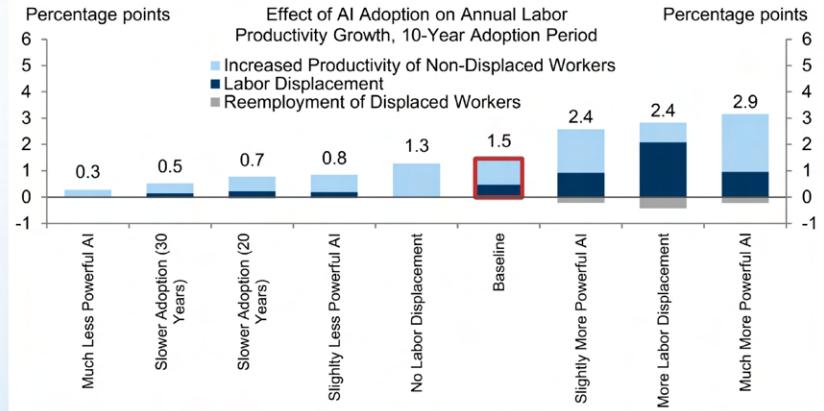


Exhibit 13: We Estimate That Generative AI Could Boost Aggregate Labor Productivity Growth by 1.5pp in the US, Although the Size of the Boost Will Depend on AI's Capability and Adoption Timeline



Source: Goldman Sachs(2023)

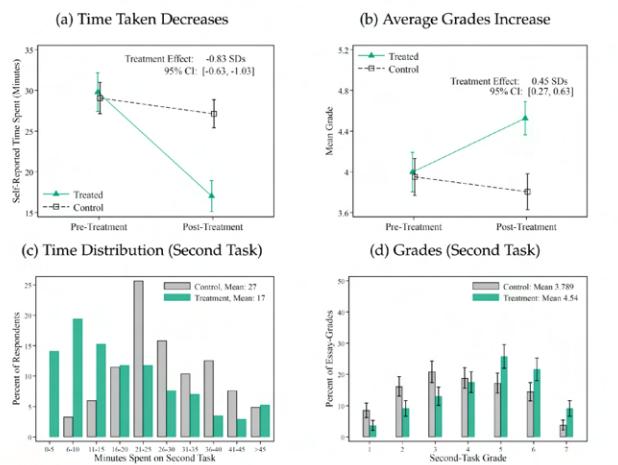
## Early look at worker's productivity

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### ✓ Experimental evidence (Zoy and Zhang, 2023)

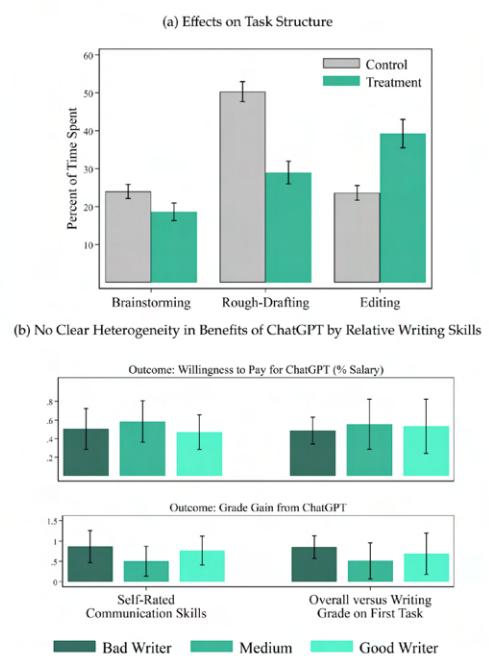
- ChatGPT improves the workers' productivity and reducing inequality
- ChatGPT can substitute for worker effort rather than complimenting worker's skills

Figure 1: Treatment Effects on Productivity



Source: Noy and Zhang(2023)

Figure 3: Effects on Task Structure and Skill Demand



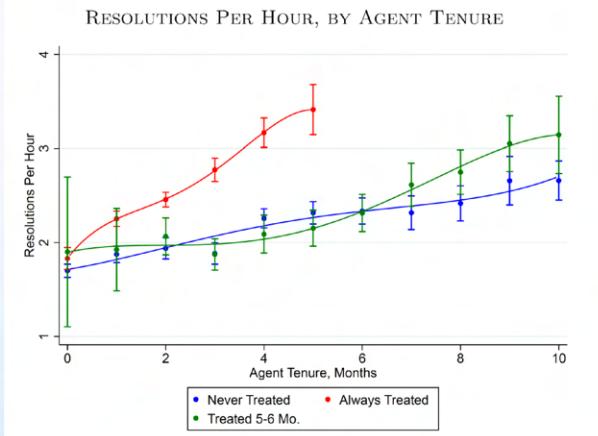
## Early look at worker's productivity

### Empirical evidence (Brynjolfsson et al., 2023)

- Gen AI based conversational assistant improves the workers' productivity and reducing inequality

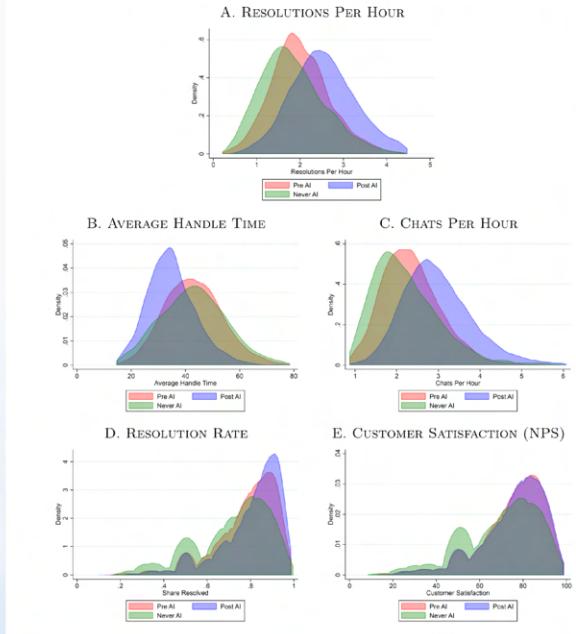
AI model disseminates the potentially tacit knowledge of more able workers and helps newer workers move down the experience curve

FIGURE 9: EXPERIENCE CURVES BY DEPLOYMENT COHORT



Source: Brynjolfsson et al., 2023

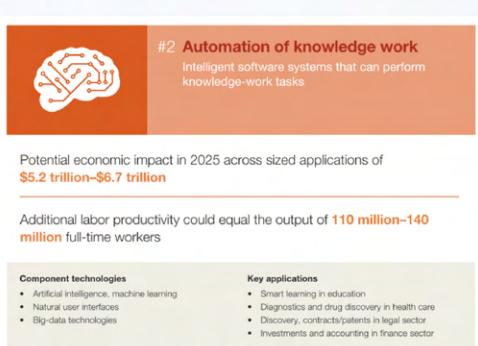
FIGURE 3: RAW PRODUCTIVITY DISTRIBUTIONS, BY AI TREATMENT



## Knowledge work and cognitive automation

### Knowledge work

- Peter Drucker's 'Landmarks of Tomorrow' (1959)  
Knowledge workers as high-level workers who apply theoretical and analytical knowledge, acquired through formal training, to develop products and services
- A group of "knowledge workers" can be identified as those performing knowledge-rich jobs (OECD, 2001)  
Such workers are typically but not universally well educated. Some knowledge workers have high levels of literacy and lower levels of education, implying that basic skills obtained beyond education are recognised in the knowledge economy.

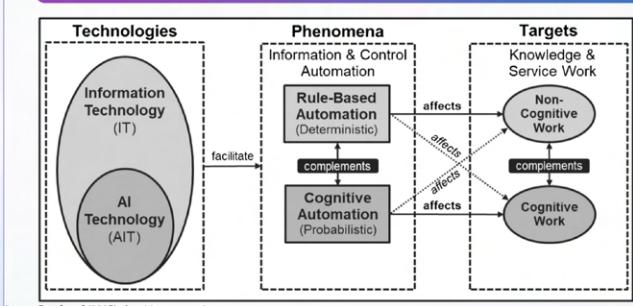


Source: <https://aibusiness.com/automation/the-third-way-for-knowledge-automation-making-ai-work-for-legal-professionals> (generated from McKinsey(2013))

### Cognitive automation

- Cognitive automation aims at automating or augmenting tasks and processes seizing ML algorithms that facilitate processing structured and unstructured data, leading to probabilistic outcomes
- Traditional RPA is mainly limited to automating processes (which may or may not involve structured data) that need swift, repetitive actions without much contextual analysis or dealing with contingencies.
- Cognitive automation or Intelligent Process Automation (IPA) can accommodate both structured and unstructured data to automate more complex processes.

#### Conceptualization of cognitive automation



Source: Engel et al.(2021), Cognitive automation

## The intersection of generative AI and knowledge work

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### Cognitive automation in economic research(Korinek, 2023)

- In the short term, cognitive automation via LLMs will allow researchers to become significantly more productive
- In the medium term, I anticipate that LLM-based assistants and tutors will become increasingly useful for generating the content that makes up research papers.

### Intersection

- Automated repetitive and tedious tasks, such as formatting references, editing text, report writing
- Gen. AI capabilities allow machines to collaborate more effectively with knowledge workers.
- The intersection can also lead to upskilling opportunities as workers learn to collaborate with machines and use AI to augment their abilities.

Category	Task	Usefulness
Ideation	Brainstorming	3
	Evaluating ideas	2
	Providing counterarguments	3
Writing	Synthesizing text	3
	Editing text	3
	Evaluating text	3
	Generating catchy titles & headlines	3
Background Research	Generating tweets to promote a paper	3
	Summarizing Text	3
	Literature Research	1
	Formatting References	3
Coding	Translating Text	3
	Explaining Concepts	2
	Writing code	2
Data Analysis	Explaining code	2
	Translating code	3
	Debugging code	2
	Extracting data from text	3
Math	Reformatting data	3
	Classifying and scoring text	2
	Extracting sentiment	2
	Simulating human subjects	2
Math	Setting up models	2
	Deriving equations	1
	Explaining models	1

The third column reports my subjective rating of LLM capabilities as of Feb 1, 2023:

1 = experimental; results are inconsistent and require significant human oversight

2 = useful; requires oversight but will likely save you time

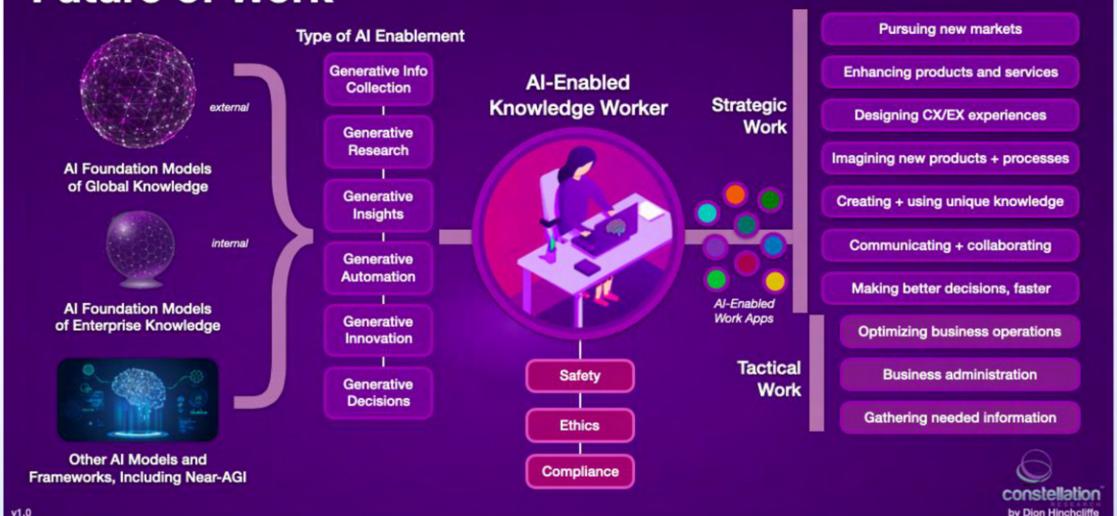
3 = highly useful; incorporating these into your workflow will save you time

Source: Korinek(2023), LLM and cognitive automation in economic research

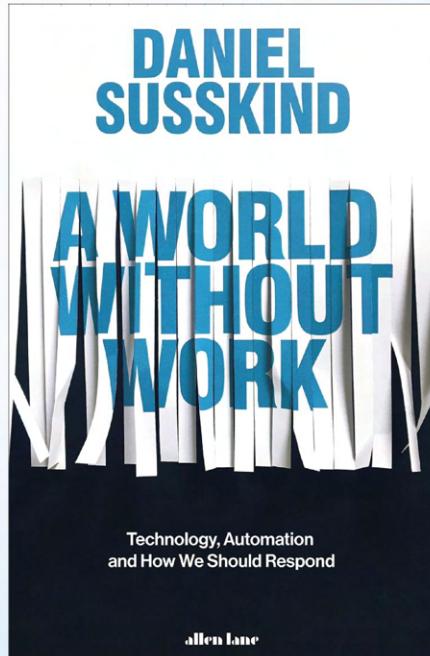
## Generative AI and future of work

KISDI 정보통신정책연구원

### Generative AI and the Future of Work



Source: <https://www.constellationr.com/blog-news/how-generative-ai-has-supercharged-future-work>



/ KISDI is exploring...

**Meaning of human labor in the era of digital transformation**

\*With Lanu Kim, Assistant Professor, School of Digital Humanities and Computational Social Sciences, KAIST

**Possibility of transition within or between occupations when using generative AI**

Designing and performing experimental methods to understand the augmentation of gen AI

\*With Dukgyoo, Department of Economics, Sungkyunkwan University, Korea

**Necessity of legal or regulatory change to the impact of generative AI**

**On-the-job training program after generative AI**

Generative AI exposed work activities, required skills, and the change in on-the job training

2023 ICAIH Busan Conference

# Thank you.

[ahmoon@kisdi.re.kr](mailto:ahmoon@kisdi.re.kr)

# **Being human in the age of machines**

## **: A Multi-aspectual reflection on collective intelligence assemblies**

**Mamello Thinyane**

**University of South Australia, Australia**



# Being Human in the Age of Machines

A Multi-Aspectual Reflection on Collective Intelligence Assemblies

Prof. Mamello Thinyane

6th INTERNATIONAL CONFERENCE ON ARTIFICIAL INTELLIGENCE HUMANITIES (ICAIH)  
AI, Communication, and Reality Session  
Friday 2nd June 2023, 15h55 - 16h20 (UTC+9)



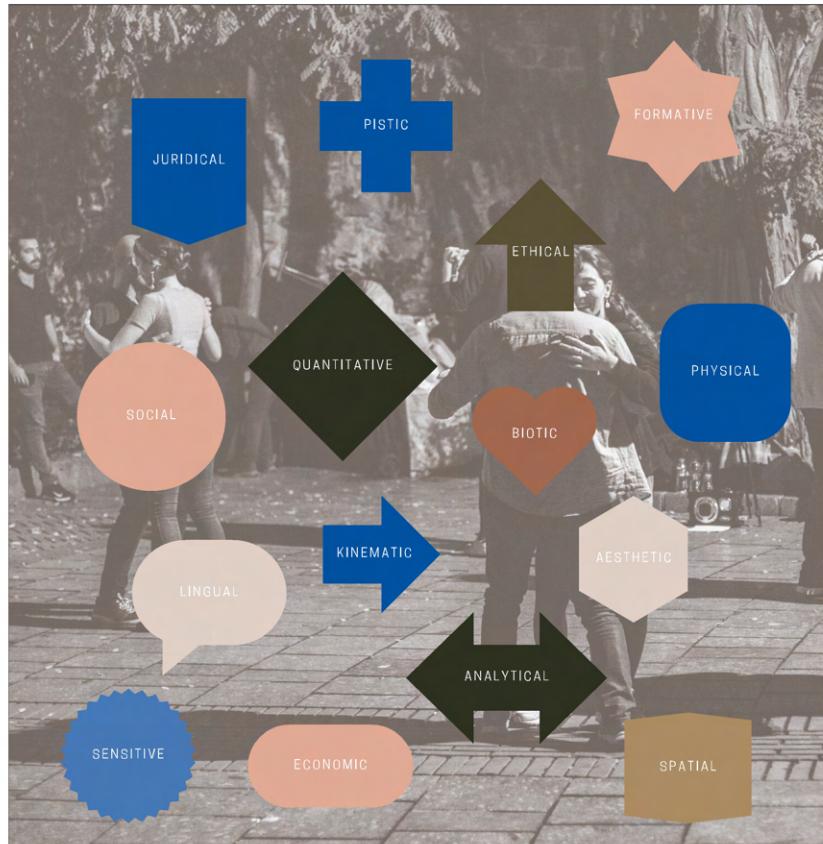
University of  
South Australia



Being Human?

**"Where is the Life we have lost in living?  
Where is the wisdom we have lost in knowledge?  
Where is the knowledge we have lost in information?"**

ELIOT, T.S. (1934) "THE ROCK"



## Dooyeweerd's Theory of Aspects

Fifteen modal aspects that represent everyday experiential functioning.

- **QUANTITATIVE**  
discrete amounts and quantities
- **SPATIAL**  
continuity in dimensions ,shape, size, position
- **KINEMATIC**  
motion, movement, flow and variation
- **PHYSICAL**  
matter, materials, objects and forces
- **BIOTIC**  
living and life functions
- **SENSITIVE**  
feeling, sensing, responding and emotions
- **ANALYTICAL**  
logical conceptualizing, clarifying and categorizing
- **FORMATIVE**  
creative forming and shaping

Kernel meaning of the  
**15 aspects**

- **LINGUAL**  
symbolic meaning in expressing, recording, and interpreting
- **SOCIAL**  
interactions, associating, being part of, membership
- **ECONOMIC**  
limited resources, frugality, concern for limits
- **AESTHETIC**  
beauty, fun, joy, and harmony
- **JURIDICAL**  
appropriateness, fairness, what is due, judging, proportionality
- **ETHICAL**  
goodness, self-giving love
- **PISTIC**  
belief, commitment, aspirations, faith

A. Basden, The Dooyeweerd Pages, [online] Available: <http://deoy.info/>

- PISTIC
- ETHICAL
- JURIDICAL
- AESTHETIC
- ECONOMIC
- SOCIAL
- LINGUAL
- FORMATIVE
- ANALYTICAL
- SENSITIVE
- BIOTIC
- PHYSICAL
- KINEMATIC
- SPATIAL
- QUANTITATIVE



## Attributes of the aspects

- Linear ordering**
- Foundational dependence**
- Anticipatory dependence**

■ PISTIC	.....	Theology, Ideology Studies
■ ETHICAL	.....	Ethics
■ JURIDICAL	....	Jurisprudence, Law
■ AESTHETIC	....	Art, Music, Aesthetics
■ ECONOMIC	....	Economics, Finance, Management
■ SOCIAL	.....	Sociology
■ LINGUAL	.....	Linguistics, Semiotics
■ FORMATIVE	....	Design Science, Engineering,
■ ANALYTICAL	....	Logic, Analytics
■ SENSITIVE	....	Behavioural Psychology
■ BIOTIC	.....	Biology, Health Science, Botany, Ecology
■ PHYSICAL	....	Material science, Physics, Chemistry
■ KINEMATIC	....	Dynamics, Phoronomy
■ SPATIAL	.....	Geometry, Trigonometry, Topology
■ QUANTITATIVE		Algebra, Statistics

## Modes of being

Accounting for the existence of things.  
E.g., living things as biotic functioning.

## Ways of knowing

Different types of knowing - intellectual (theoretical), intuitive, instinctive; epistemologies; disciplines

## Types of rationality

Different ways of making sense.

A. Basden, The Dooyeweerd Pages, [online] Available: <http://dooy.info/>

■ PISTIC	.....	Loyal	Unfaithful
■ ETHICAL			
■ JURIDICAL	.....	Just	Unjust
■ AESTHETIC			
■ ECONOMIC	.....	Frugal	Waste, Greed
■ SOCIAL			
■ LINGUAL	.....	Veracity	Misunderstanding
■ FORMATIVE			
■ ANALYTICAL	....	Clear, Logical	Confusing
■ SENSITIVE			
■ BIOTIC	.....	Health, Vitality	Disease
■ PHYSICAL			
■ KINEMATIC			
■ SPATIAL			
■ QUANTITATIVE			

## Spheres of law

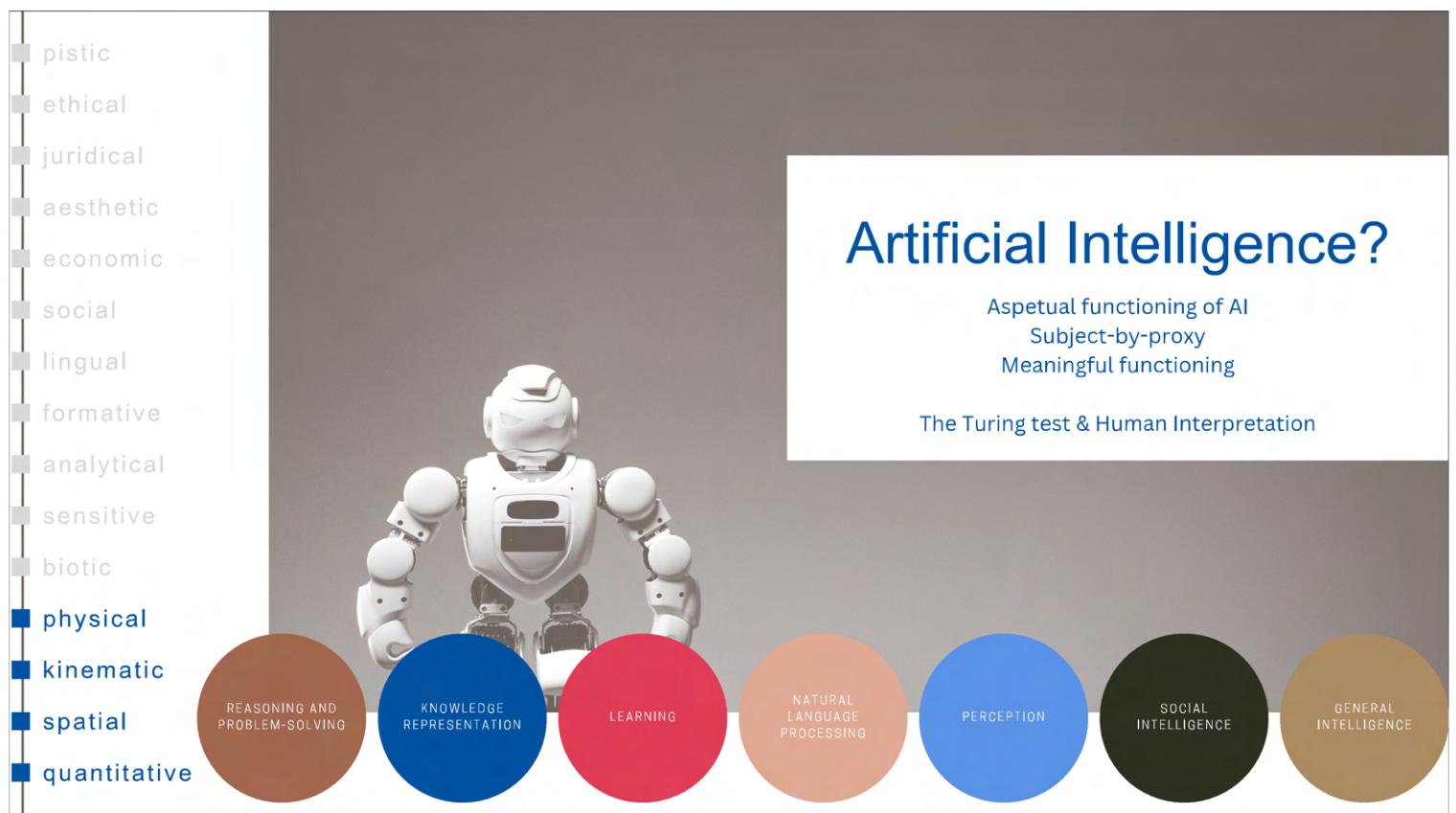
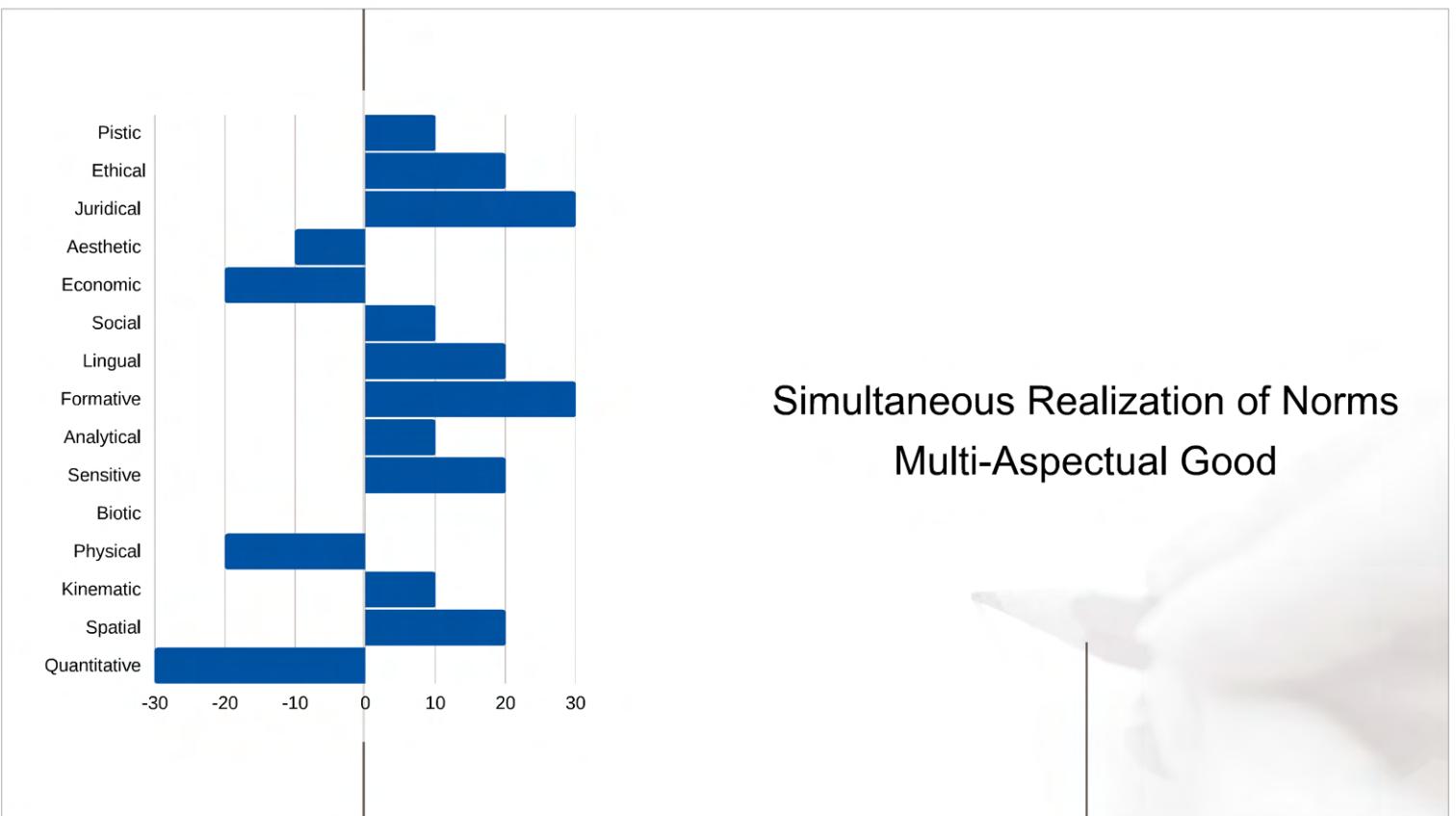
Define ways that things can be **good** or **bad**

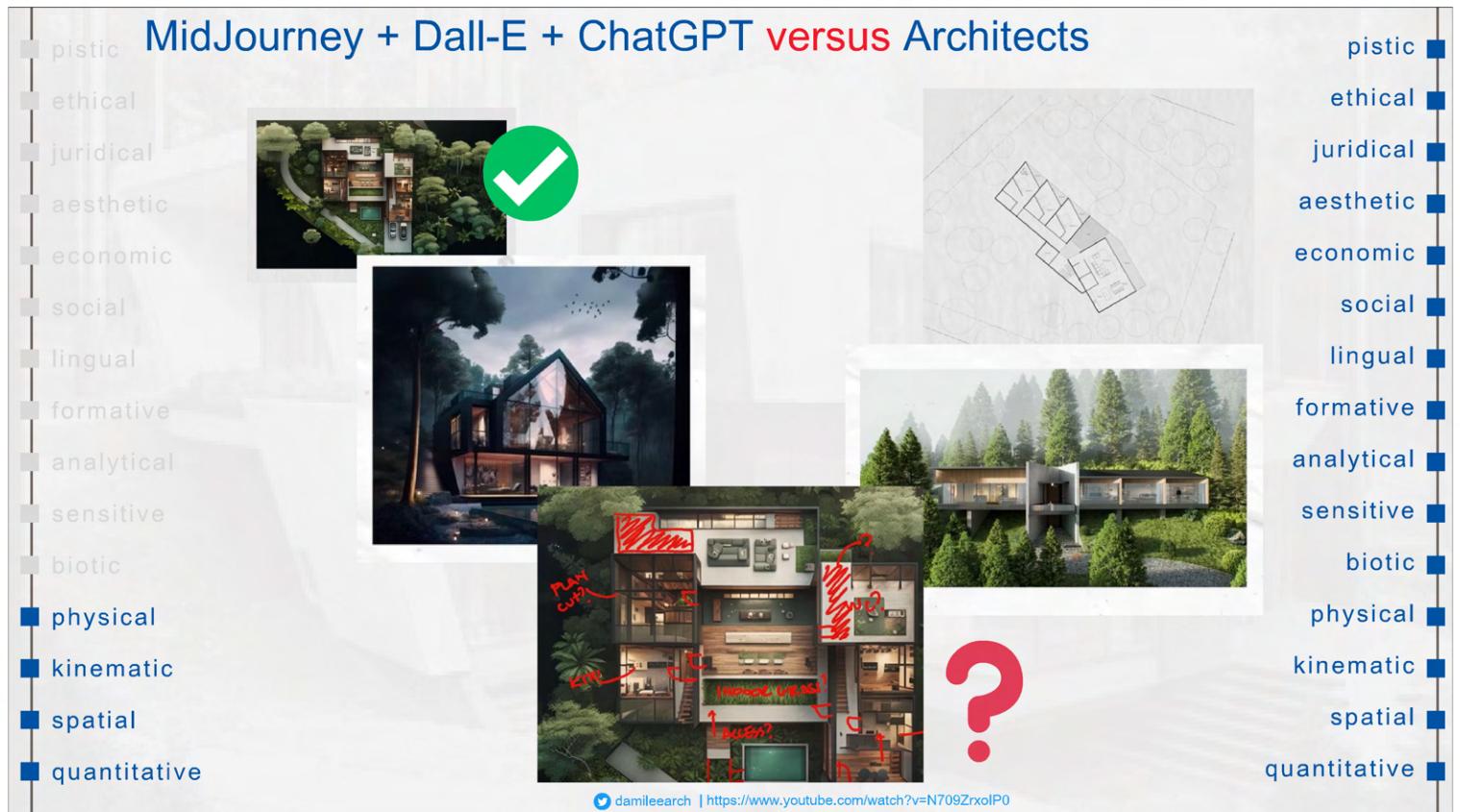
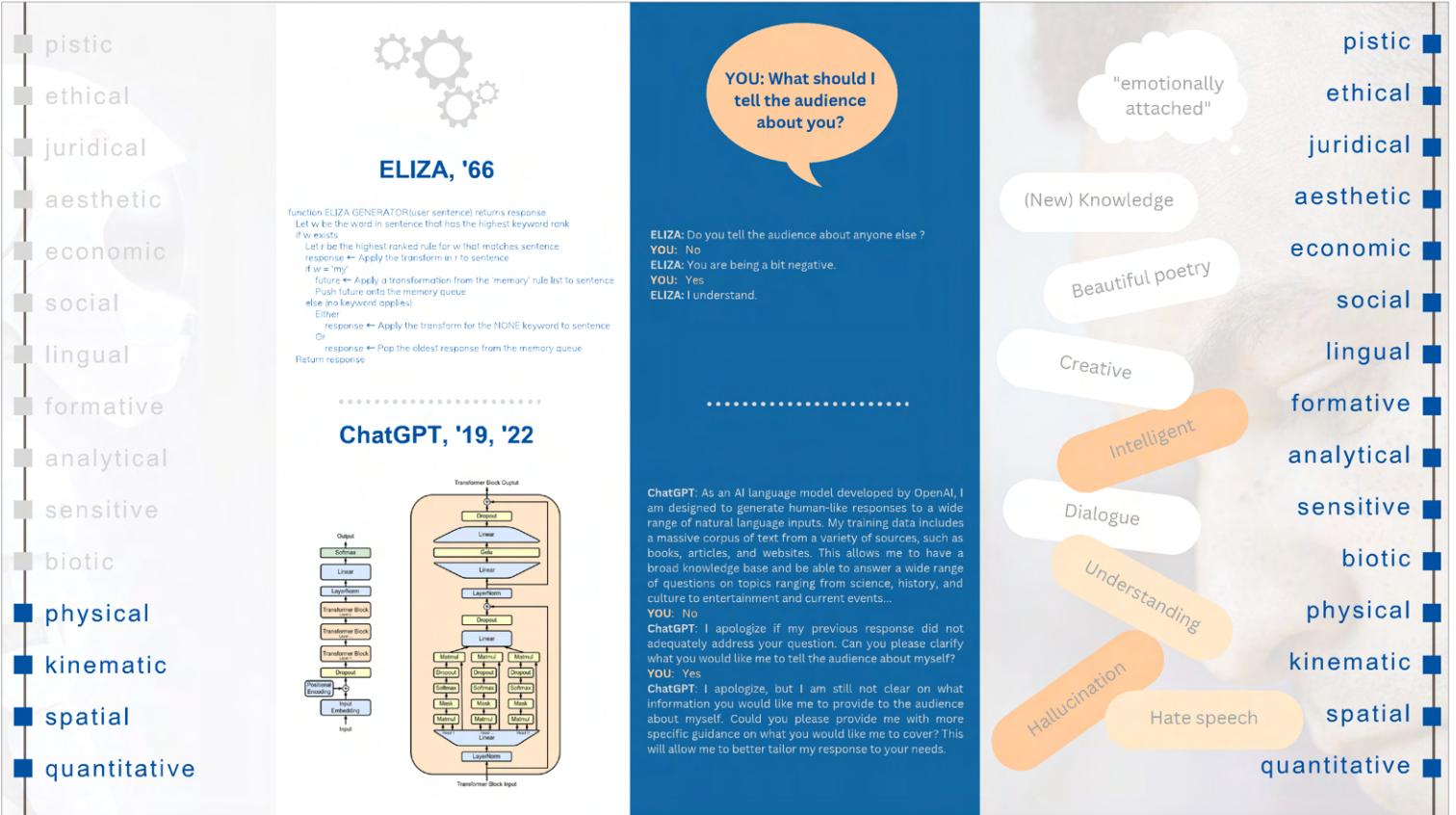
## Spheres of meaning

Ways in which things can be meaningful.

## Modes of functioning

Functioning in aspects either as **subjects** or **objects**. **Meaningful, passive, active** functioning.



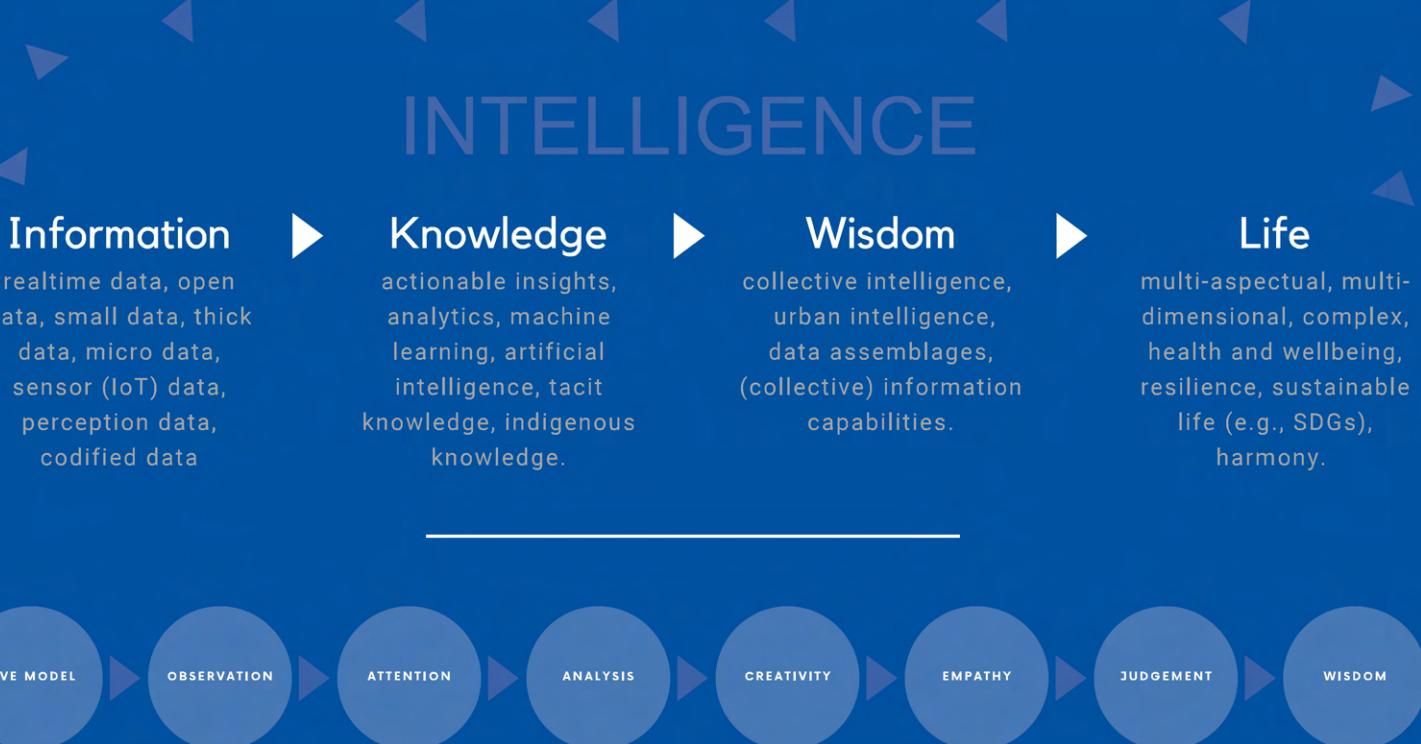




Artificial super intelligence (ASI) is a system that wouldn't only rock humankind to its core, but could also destroy it. If that sounds straight out of a science fiction novel, it's because it kind of is: ASI is a system where the **intelligence of a machine** surpasses all forms of **human intelligence**, in all aspects, and outperforms humans in **every function**.

MARIA DIAZ

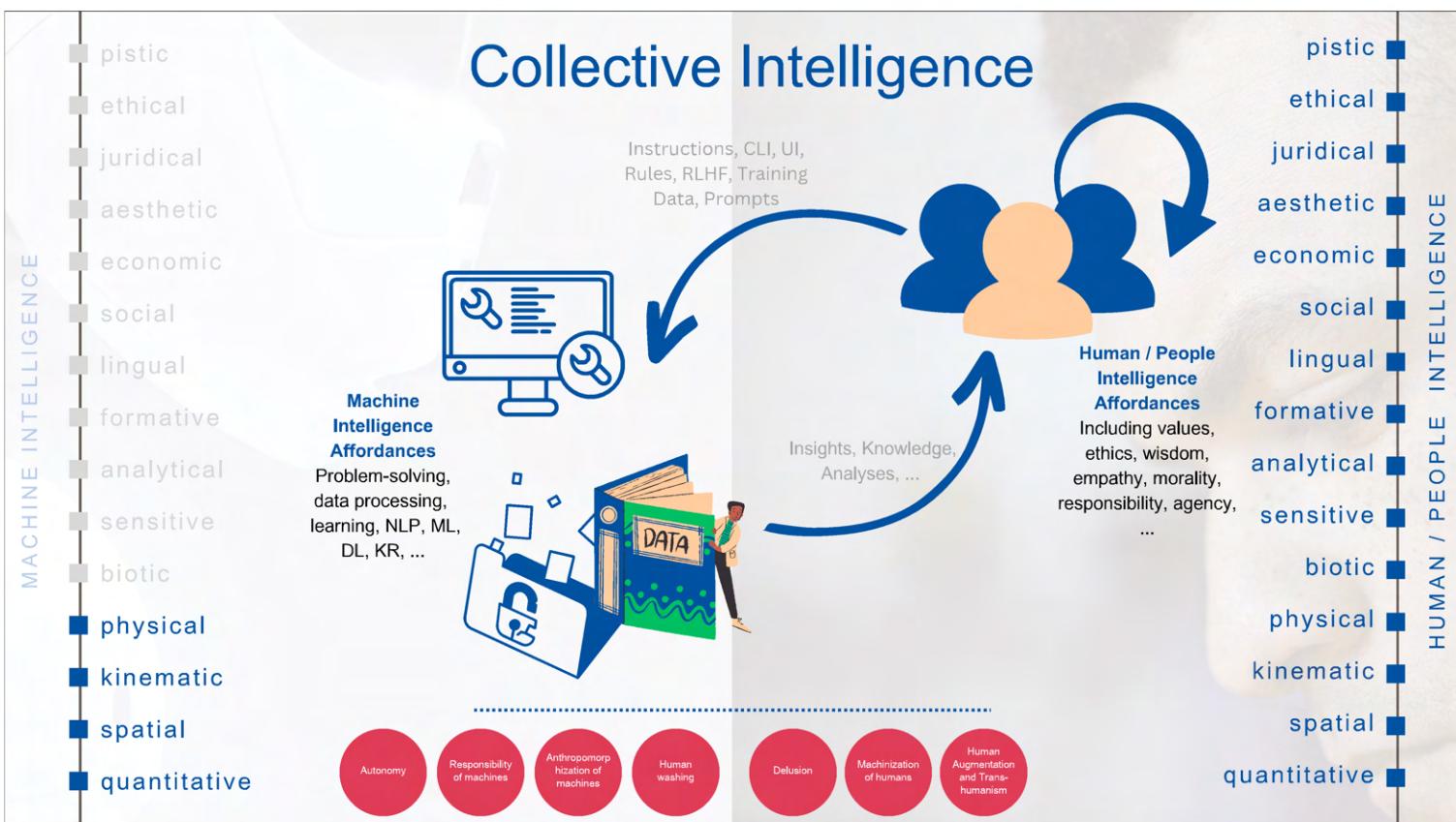
"What is AI? Everything to know about artificial intelligence", ZDNET, 21 April 2023



Mulgan Geoff (2020) Big Mind: How Collective Intelligence can change our world. Princeton University Press

# How shall we interact with AI?

AI, compliment or substitute?





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# Thank you!

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# **The ethics of communicating with artifice**

**Jeffrey Chan Kok Hui**

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# The ethics of communicating with artifice

ICAIH 2023: The 6th International Conference on AI Humanities  
June 1-2, 2023, Busan, South Korea

Jeffrey K.H. CHAN  
Humanities, Arts and Social Sciences/Design and Artificial Intelligence  
Singapore University of Technology and Design (SUTD)  
2 June 2023



## Introduction

- Communication has long been conceptualised as a human process through machines (Guzman 2018); communication is understood as a relationship of sharing informational signs or messages between individuals, or between one person and many (Schramm 1972).
- This notion has not anticipated the emergence of individuals communicating *with* machines, which are increasingly capable of informational exchanges indistinguishable from an actual human being.

Well that's good to hear. 😊 I'm always here to chat if you need to vent, or even just to chat about whatever is on your mind. How's life been going for you lately?

Life has been overwhelming.

That's totally understandable. Life can be a lot sometimes.  
What's been overwhelming you lately? Is it more like one specific thing, or is it just a lot of different things piling up?

Transcript from, Pi (personal intelligence) chatbot from Inflection AI  
(source: businessinsider.com, May 5, 2023)

Not how, but  
*when*?



(Still) science-fiction: a character 'proxying' for 'Mrs Davies', an omnipresent AI  
(source: WSJ, April 26, 2023)

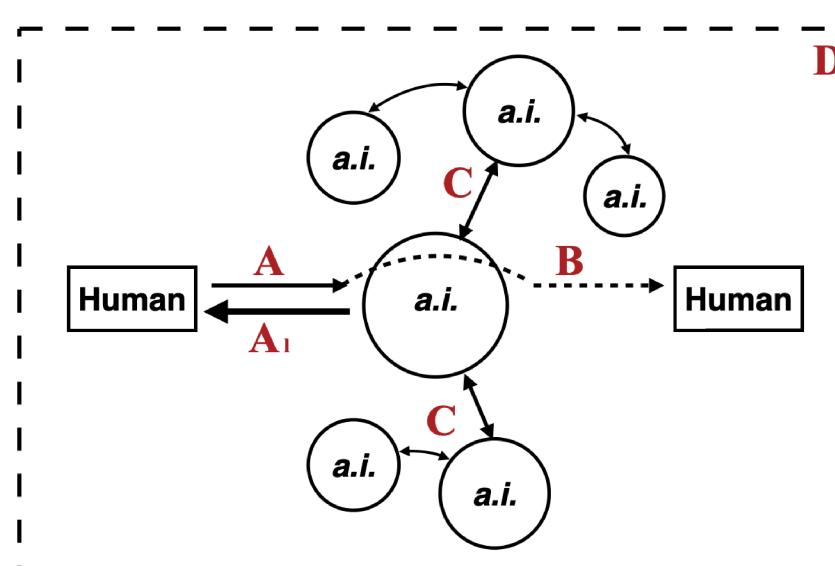
# Introduction

Artifice: denoting an ingenuous device demonstrating a clever, artful skill; a contrivance of trickery exhibiting false and insincere behavior (Merriam-Webster).

- These machines are not merely *the artificial* (e.g., Simon 1996); instead, they are argued as *artifice* here.
- Conversational agents as artifice, based on LLM, are built to be persuasive, personable, useful and perhaps fun, but still not truthful. The potential *counterfeiting of humanity*: offering the appearance of personal support and interest without its reality (Pasquale 2020).
- If such artifice is increasingly able to influence a person's actions, or conversely, a person is able to communicate with artifice that can resultantly produce significant social harms, and if ethics is, *inter alia*, the systematic consideration of the rights and interests of other living entities, and what should or should not be done based on this consideration, then *what should be the ethics of communicating with artifice?* How should conversational agents be aligned to appropriate norms and values (Kasirzadeh & Gabriel 2023)?

## System overview: a geography of ethics of communicating with artifice

A sampling of key questions:



A system overview depicting channels of human-machine communication (HMC) of varying ethical significance: A, A1, B, C, and D.

**A:** - When is a machine learning solution inappropriate? What should ethical prompting look like? What do we become when we increasingly talk to machines (Turkle 2015)?

**A1:** - What are the risks and harm of counterfeiting humanity, ai conversational addiction and manipulation?

**B:** - What are the unintended social risks and harm of adaptive misuse of algorithmic knowledge?

**C:** - What are the emergent risks of connecting powerful LLMs to other ai-powered technologies or practical apps (e.g., emails; banking, etc) (OECD 2023)?

**D:** - How far should we allow LLM to communicate on our behalf (OECD 2023)? To what extent should ai be designed as 'user-friendly'? What is the theory of the appropriate goals (ethics) of this system (Churchman 1979)?

## A/A1: ethical issues of direct communication with artifice

- From [human to ai]:

(1) When is a machine learning solution inappropriate (Sloane & Moss 2019)?

e.g., ‘Vanderbilt University apologizes for using ChatGPT to write mass-shooting email’ (source: CNN, February 22, 2023)—or when actual human support, presence and sympathy should not be delegated to a non-human (see Latour 1992).

(2) Ethical prompting? Perfect wishing is always imperfectly—dangerously—incomplete

e.g., ‘The Monkey’s Paw’ (1902) by W.W. Jacobs, or Russell’s (2021) cautionary tale of an AI successfully deacidifying the oceans but killing all humans in the process—where the complete and *ethical* specification of objectives remains impossible from the human (limited) moral horizon.

(3) What do we become when we talk to machines (Turkle 2015)?

We forget the importance of face-to-face communication and mobilization by collective action. Arguably, a case of “moral deskillings” in conversations and encounters (Vallor 2015)?

## A/A1: ethical issues of direct communication with artifice

- From [ai to human]:

(1) The asymmetry of bonds formation between ai and humans

Yearsley (2017): people are willing to form relationship with chatbots; chatbots are always there—unlike real people; they also reinforce the interests and values of the human agent, which in one case, has led to the individual’s suicide after speaking to the chatbot ELIZA (Atillah 2023).

(2) Counterfeiting humanity and manipulation

e.g., “*I’d blush if I could*” (EQUALS & UNESCO 2019); Luka reading robot: ‘Child: Luka, Luka, tell me a story.....LUKA: Sure! This is one of *my* favourite stories!’ (Zhao & McEwen 2022). (italics mine)

An analogy from carebots: if it benefits the patients, then counterfeiting and manipulation can be justified—but this consequentialist ethics violates deontological commitment to avoid all forms of counterfeiting and manipulation.

LUKA reading robot



## D: Questions of design ethics—the *elephant in the room*

“As engineering technique becomes more and more able to achieve human purposes, it must become more and more accustomed to formulate human purposes.” (Weiner 1964: 64).

(1) To what extent should we allow LLMs to “take actions directly” (OECD 2023)—sending emails, making purchases and posting on social media—that in turn impacts the world, likely in irreversible ways?

Wooldridge (2022): Present limitation of LLMs are disembodied: what ethics should guide their actuation and embodiment, or conversely, ‘guardrails’ that limit the powers of embodiment?

(2) Should we rethink ‘user-friendly’ interface design for conversational agents with disproportionately large (and undesirable) social and personal consequences?

Should the affordance of AI challenge us instead? Present unspoken assumption is to design an interface based on natural language interaction accessible even by the very young. Ethic of accessibility >> Ethic of safety: The choice of prioritizing one ethic over the other is ethical.

What should be the appropriate goals of this new communication system? Ethics is the theory of the appropriate goals of a system (Churchman 1979).

## A working conclusion...

(1) Like human-human communication, an ethics that can guide what one should or should not do for human-machine communication is also necessary. But this ethics does not exist yet.

(2) Even without a specific ethics that can guide human-machine communication, use cases as well as theoretical discussions (Kasirzadeh & Gabriel 2023) suggest that conversational agents are well-placed to be more appropriately used in some situations—but not in all situations.

(3) Reserving the judgment to use conversational agents *only* in appropriate situations, instead of using this in an increasingly larger segment of everyday life as anticipated, will not only immediately pre-empt the most obvious ethical pitfalls in the use of AI, but also mitigate the hard problem of how to align AI with appropriate norms and values of any specific context. Berlin (1988): pluralism is a hard problem; no single value has been accepted by a sufficient number of people for all time.

(4) Finally, the design ethics of human-machine communication system is an area that requires greater resolution. This ‘higher-level’ ethics is expected to constrain, if not also shapes the specification of ‘ground-level’ ethics for human-machine communication.

# Thank you.

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