The background features a dark, abstract design. On the left, several glowing lines in red, orange, and yellow radiate outwards from a central point. A large, solid black circle is positioned on the right side of the slide, partially overlapping the text area.

**HSS Seminar, 9:00-10:30 Feb 2<sup>nd</sup>, 2026**

# **Survive with good information**

**Liang Zhao**

**Members of Future Wisdom**

L5: A. Tanimoto, Y. Li, R. Goperma; L4: R. Basnet;  
PD: N. Lucic; Researcher: H. Liu, J. Fatima

**Nature gives life freedom; Life uses it to find order.**

# Exemption

I tried my best to prepare this sharing and hope it is useful but, due to my own limitations, please consider it **on your own responsibility**.

**"The more I see, the less I know for sure."**

- John Lennon



**Bias** is necessary, but it can also be misleading.

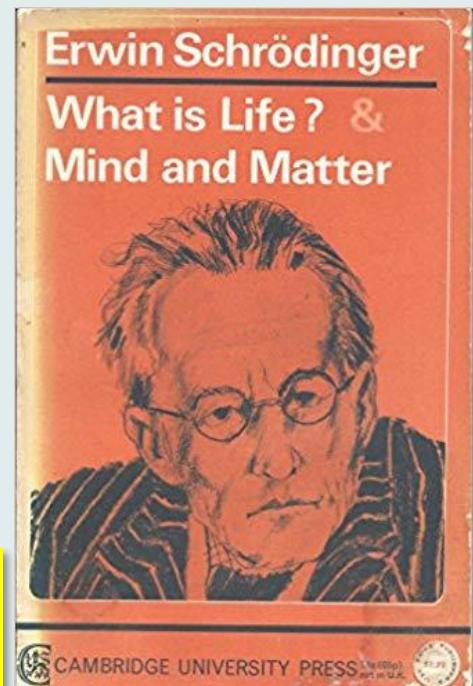
# Survivability: a perspective from Science

- **Schrodinger** observed that **matter follows the second law of thermodynamics whereas life seems not** (*What is life?* 1944).
- **The law** says that “*Every process occurring in nature* proceeds in the sense in which the sum of the **entropies** of all bodies taking part in the process is **increased**,” (Max Planck, 1897)\* where **entropy** is a quantity to estimate the state of **disorder** (uncertainty, freedom, etc). Thus, **entropy ↑ implies disorder ↑**.

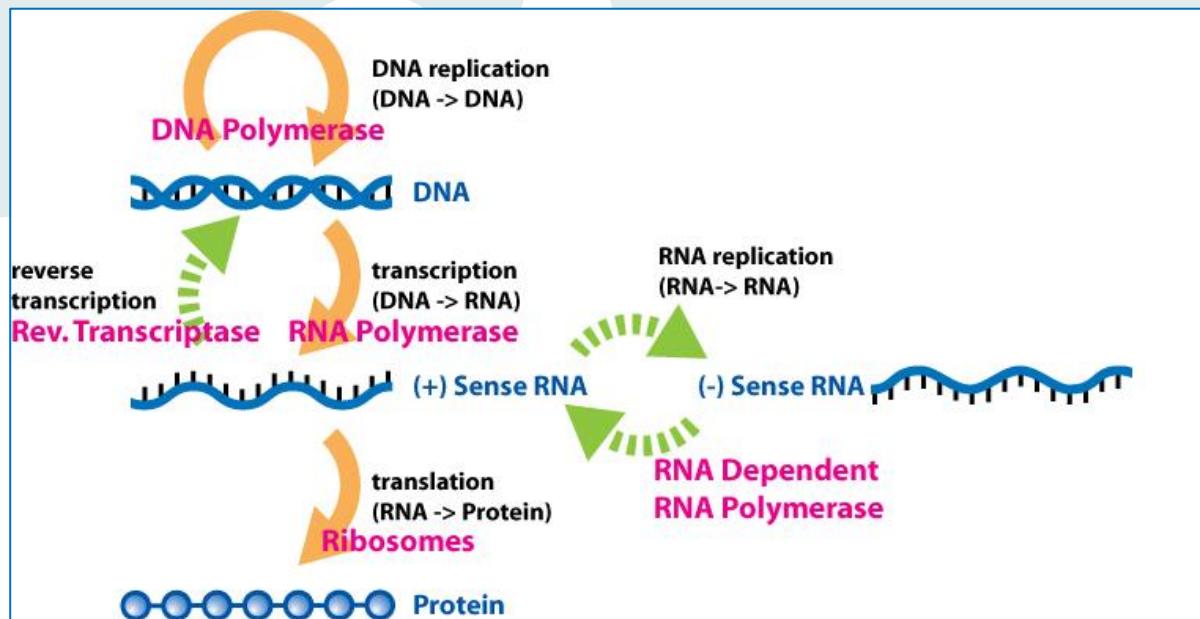
\*Different statements also exist.

Schrodinger's observation suggests that the **essence of life** (i.e., **survivability**) is associated with **finding (good) orders**.

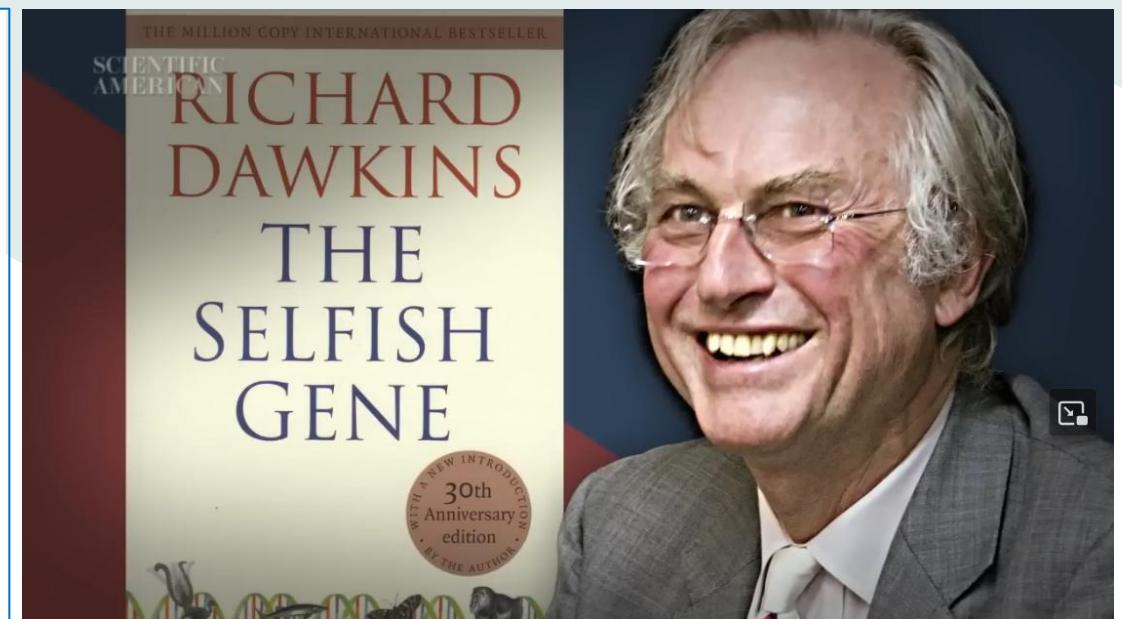
**E. Schrodinger:** 1933  
Nobel Prize in Physics



# Notice life processes order with information



Extended Central Dogma, By User:Dhorspool, CC BY-SA 3.0,  
<https://commons.wikimedia.org/w/index.php?curid=26070240>



<https://www.scientificamerican.com/video/are-genes-really-selfish2013-12-09/>

**Genetic information** has a history of about 4 billion years - What a wonder!

# Now brain information becomes more important

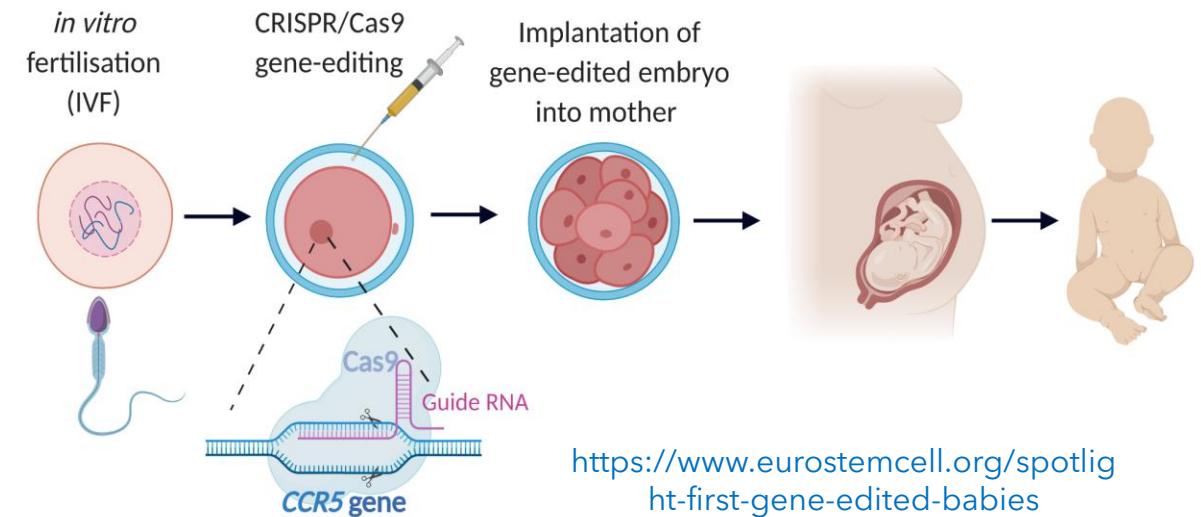
## Some recent evidences:

- Hereditary succession -> Democracy (e.g., "One man, one vote", 1880)
- Gender equality (e.g., "One man, ..." -> "One person, ...", 1960)
- Colorism -> Black lives matter



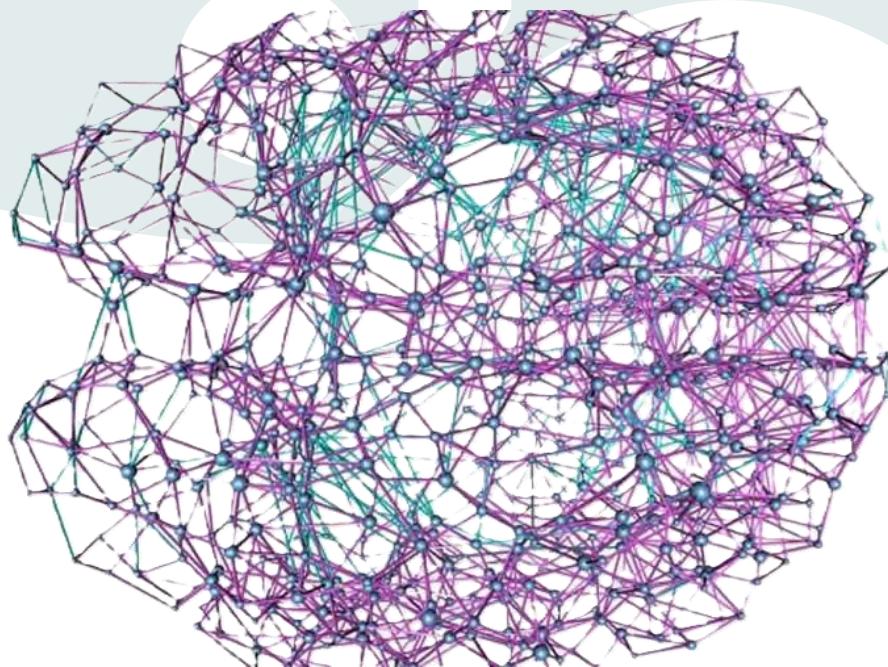
J. Doudna & E. Charpentier shared the 2020 Nobel chemistry prize for discovery of CRISPR.

<https://www.nature.com/articles/d41586-020-02765-9>

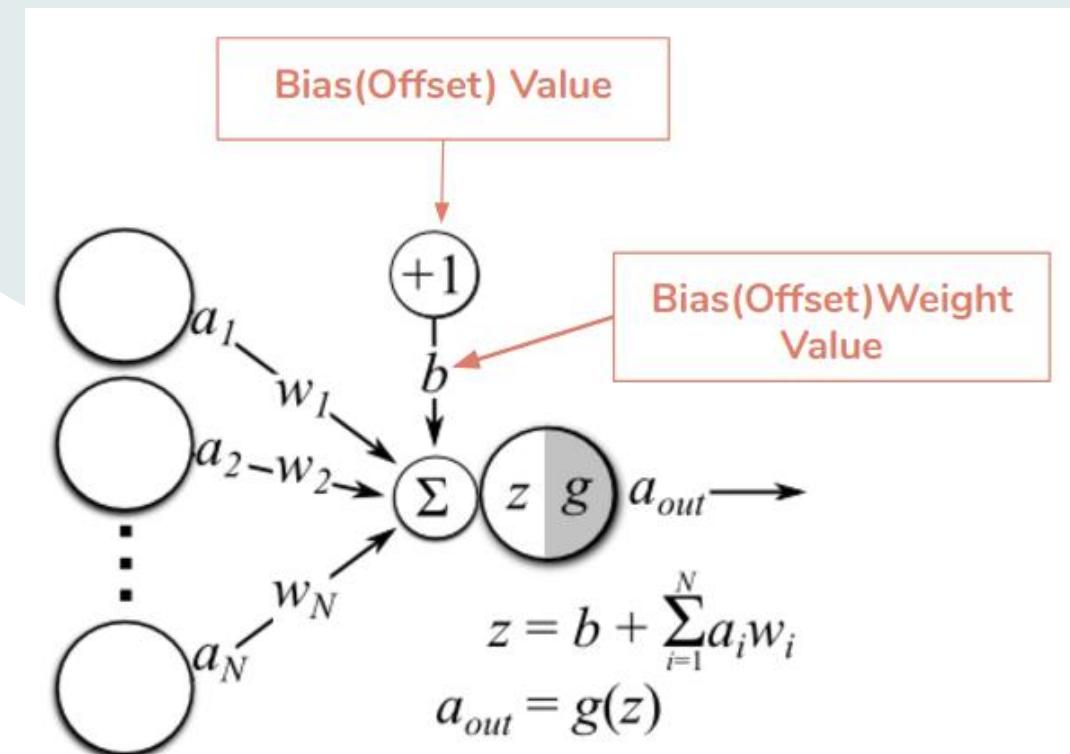


<https://www.eurostemcell.org/spotlight-first-gene-edited-babies>

# Today, AI/ICT helps us to find/share more orders



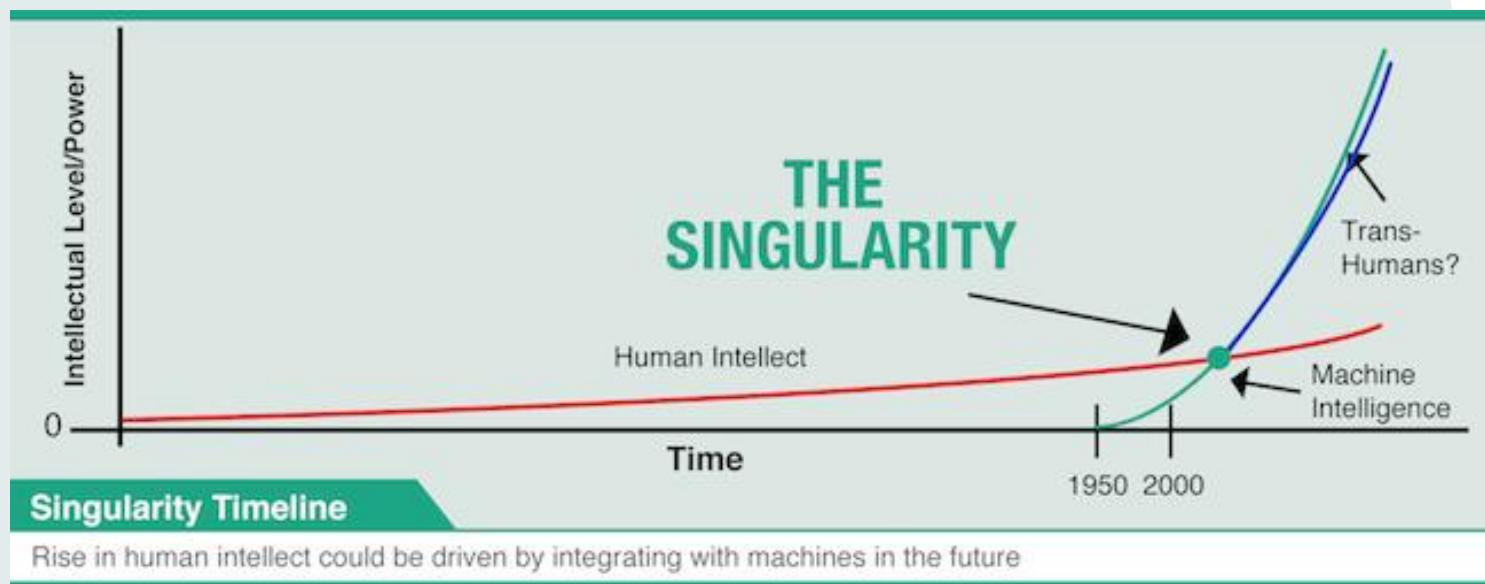
<https://neurosciencenews.com/neural-networks-evolution-brain-2203/>



<https://machine-learning.paperspace.com/wiki/weights-and-biases>

AI learns from brain including neural network, bias, dropout, attention, etc.

# In the future (2045?), AI may surpass human. Do you think so? Are you ready for that?



# Our studies

- **Information Wisdom Theory:** next slide
- **Information/order finding:** Graph learning (Li), medical AI (Goperma), AI for Science (Basnet), math & algorithm for graphs (Fatima, me)
- **Information/order sharing:** Representative theory & One person, one vote (Tanimoto, Lucic, me), equality & socio-economic indicators (Lucic, me), AI agent (Goperma, Basnet), leadership (Liu, me), social networks (Fatima, me)

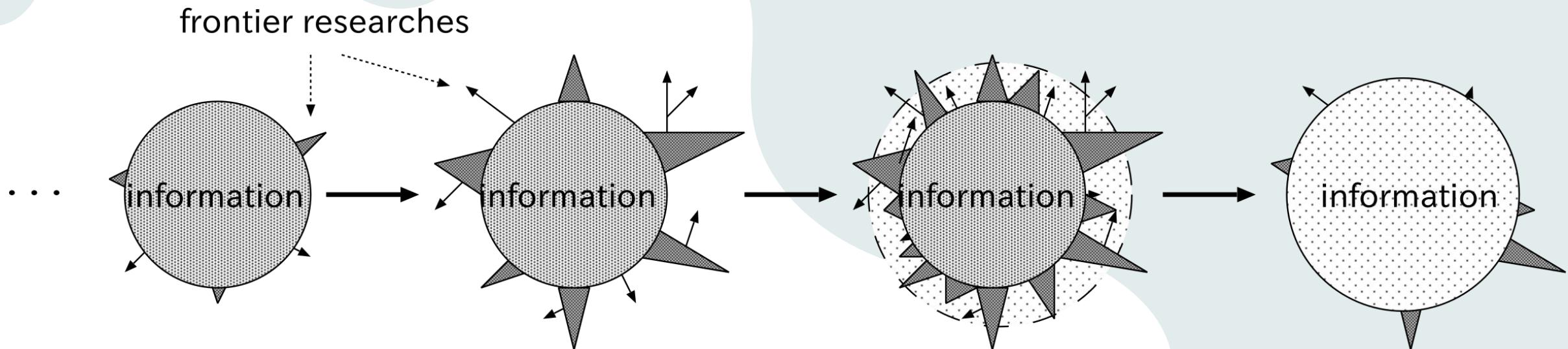
Living in this exciting information era, we are indeed lucky.

# My lecture: Information Wisdom Theory

- It studies life, human, society, and AI from the perspective of information.
- Output in 2025 (Students' studies)
  - Life & religion & oshikatsu (fan activities, 推し活) (a student from G.S. Economics)
  - A proposal of Health Care 3.0 (G.S. Medicine)
  - Call for study on ethics of gene-edited (designed) babies (G.S. Agriculture)
  - Fiction to reality: Fictionality in architecture (GSAIS)
  - A proposal of Meaning/Information Conversion Efficiency of energy (G.S. Energy)
  - Art/Culture: meme of humanity (G.S. Management), etc.

# APPENDIX

# Information finding: Research as an example



Start -> Review the literature (theory & frontier) to identify the **chaos** (spikes) ->  
Find more evidences and propose a **good theory** to clear/cover the chaos.

**Recent AI can do most of the works -> AI for Science (Rojan's interest).**

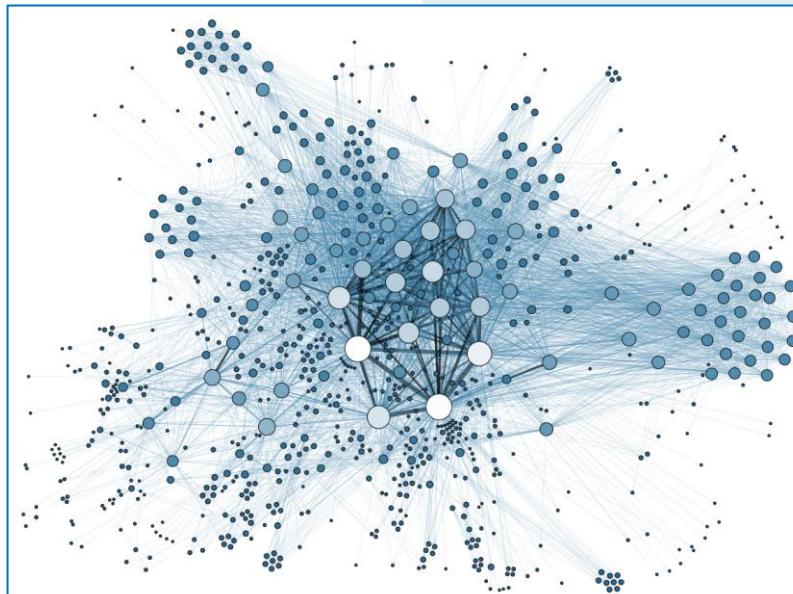
# From finding to sharing

**Genetic** -> **heredity**; **in-brain** -> **interactions**. Particularly, **human** has found efficient ways via external media, society, and recently, ICT systems and AI too.



Claimed "Oldest known drawing by human hands", discovered in [Blombos Cave](#) in [South Africa](#). Estimated to be 73,000 years old. [\[2\]](#)

[https://en.wikipedia.org/wiki/Prehistoric\\_art](https://en.wikipedia.org/wiki/Prehistoric_art)



[https://upload.wikimedia.org/wikipedia/commons/9/9b/Social\\_Network\\_Analysis\\_Visualization.png](https://upload.wikimedia.org/wikipedia/commons/9/9b/Social_Network_Analysis_Visualization.png)

December 11, 2025 Product Release

## Introducing GPT-5.2

The most advanced frontier model for professional work and long-running agents.

## A new era of intelligence with Gemini 3

Nov 18, 2025  
13 min read

Gemini 3 is our most intelligent model that helps you bring any idea to life.

 Sundar Pichai  
CEO, Google and Alphabet

 Demis Hassabis  
CEO, Google DeepMind

 Koray Kavukcuoglu  
CTO, Google DeepMind and Chief AI Architect, Google

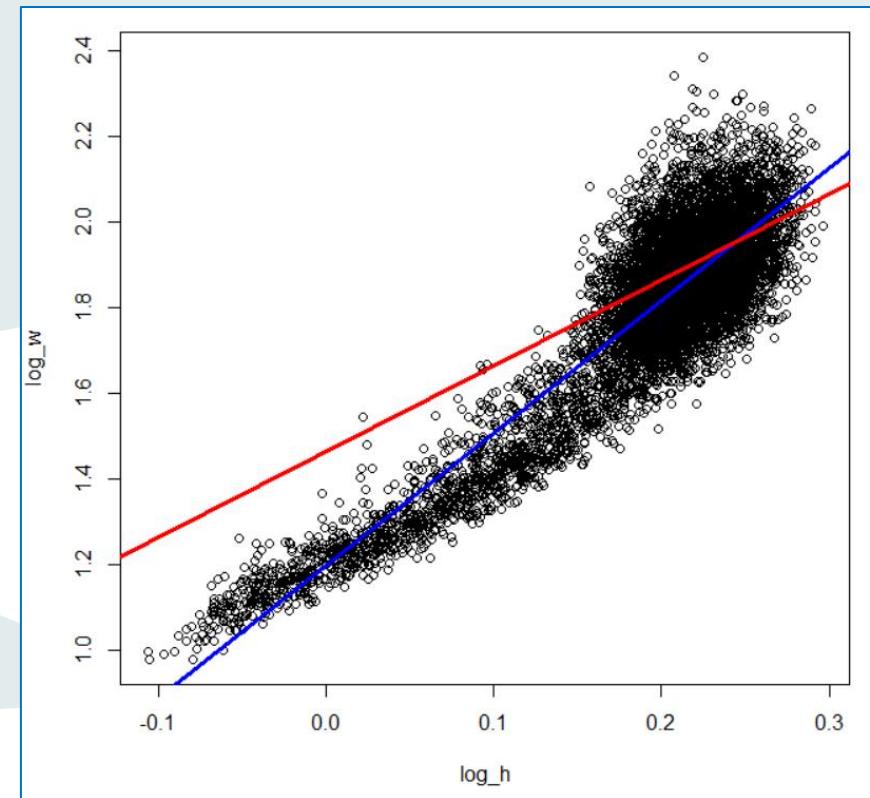
Share

# APPENDIX for discussion on Jan 15th

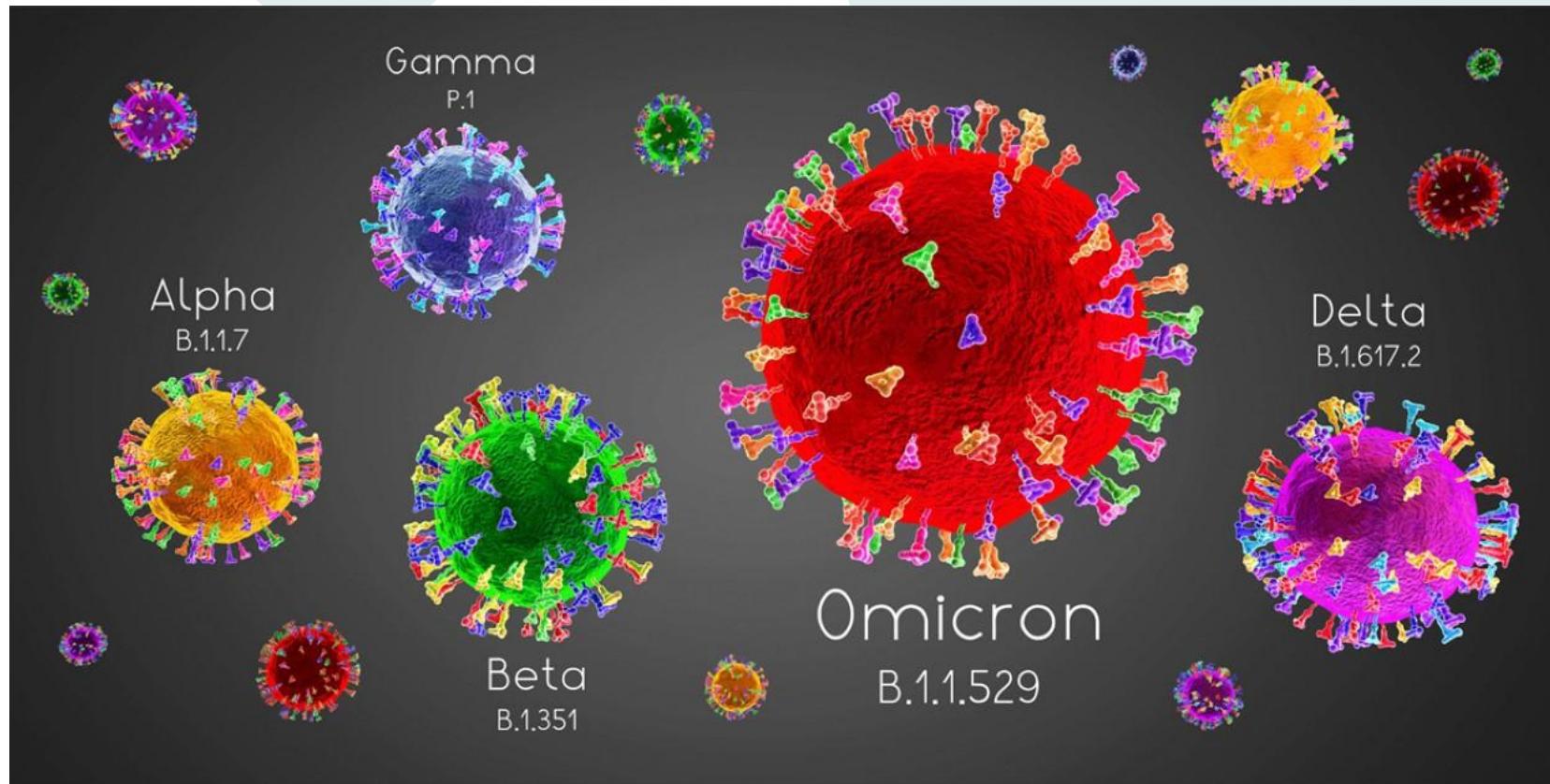
# Machine Learning (ML): Key of today's AI

- Assuming the data follows a relation  $y = f(x)$ , ML is to find the optimal parameters that decide  $f$  from known data (= learn) and uses it to predict unknown data.  
**(Machine finds good information.)**
- E.g., linear regression  $\rightarrow f(x) = ax + b$ ; deep learning  $\rightarrow$   $f$  is defined by an artificial neural network.

An example of linear regression



# How life finds **good** information?



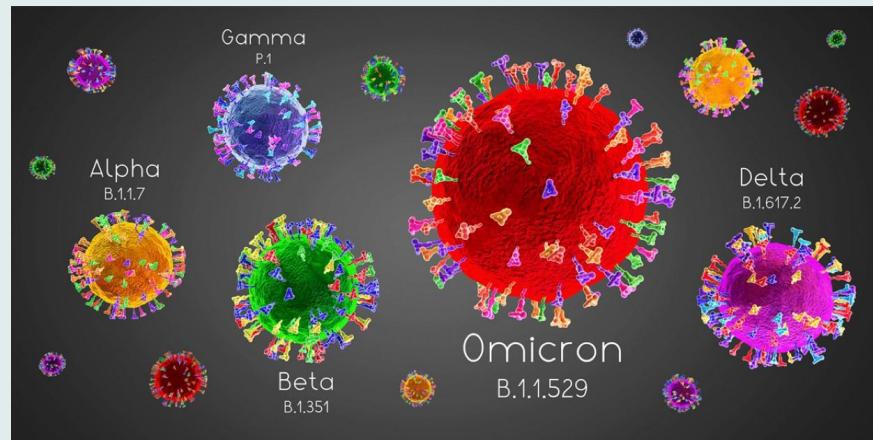
**Life:**

- **Heredity**
- **Mutation**

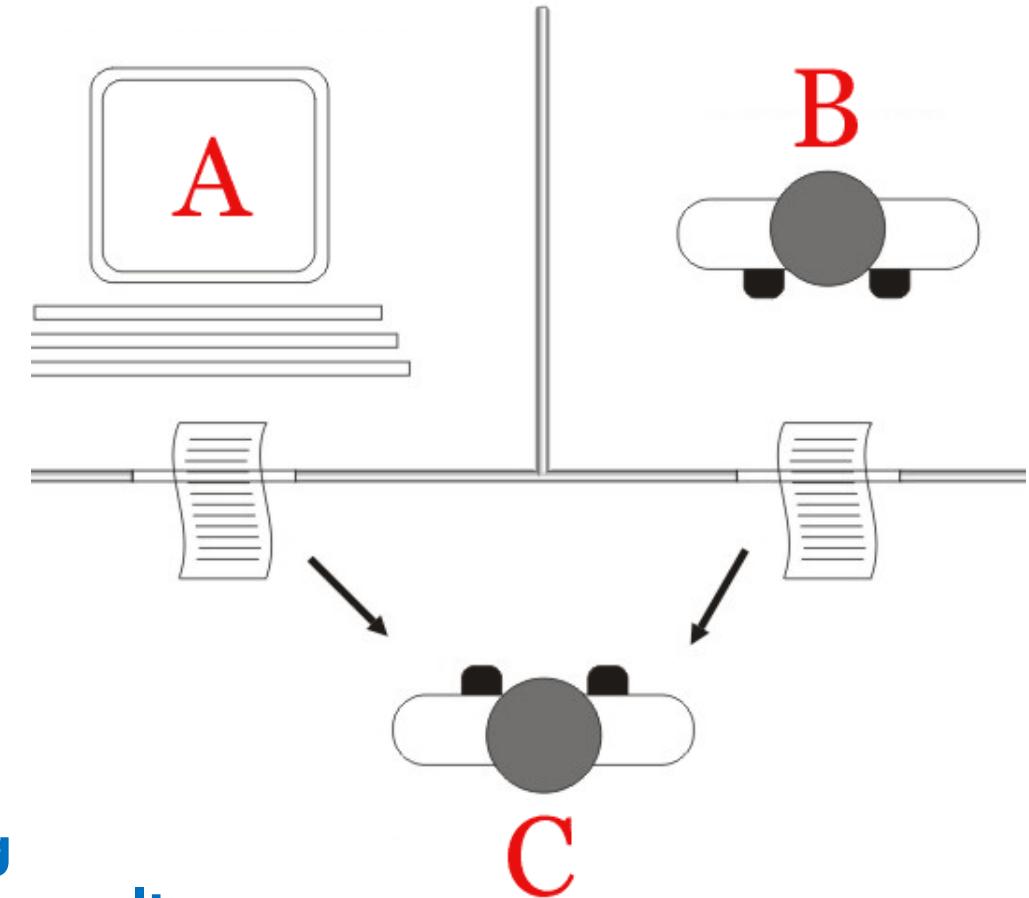
# Hint from AI study & wisdom of survivability

Turing test suggests that human-like intelligence may be mimicked by combining **knowledge** and **randomness**, which align with the actions to survive.

**survive = learn + do randomly**



**Life**  
**Heredity: learning**  
**Mutation: random result**



Turing Test, By Juan Alberto Sánchez Margallo, CC BY 2.5,  
<https://commons.wikimedia.org/w/index.php?curid=57298943>

# Evidence from neuroscience

## サライアンス・ネットワーク

## Salience network

デフォルト・モード・ネットワークとエグゼクティブ・コントロール・ネットワークの仲介役

Switch the next two networks

Default mode network

Executive control network

デフォルト・モード・ネットワーク

エグゼクティブ・コントロール・ネットワーク

Activated for free, creative works (**Do randomly**)

Activated for goal-guided works (**Learn**)

前頭前皮質  
内側部

後帯状皮質

前頭前皮質  
背外側部

後頭頂皮質

反相関

Practice by our society (e.g., globalization or localization)



**survive = learn + do randomly**

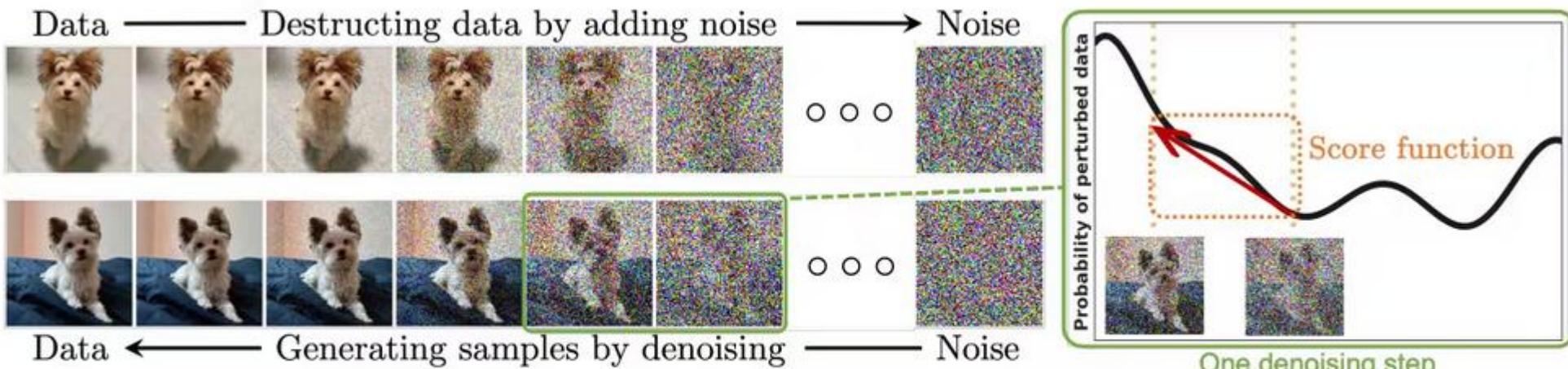
# Mastering the game of Go with deep neural networks and tree search

David Silver [✉](#), Aja Huang, Chris J. Maddison, Arthur Guez, Laurent Sifre, George van den Driessche, Julian Schrittwieser, Ioannis Antonoglou, Veda Panneershelvam, Marc Lanctot, Sander Dieleman, Dominik Grewe, John Nham, Nal Kalchbrenner, Ilya Sutskever, Timothy Lillicrap, Madeleine Leach, Koray Kavukcuoglu, Thore Graepel & Demis Hassabis [✉](#)

*Nature* 529, 484–489(2016) | [Cite this article](#)

105k Accesses | 3632 Citations | 3127 Altmetric | [Metrics](#)

## Abstract



## Diffusion Models: A Comprehensive Survey of Methods and Applications

<https://encord.com/blog/diffusion-models/>

**survive = learn + do randomly**

ng of classic games for artificial  
ficulty of evaluating board  
computer Go that uses 'value  
to select moves. These deep  
vised learning from human  
If-play. Without any lookahead  
ne-art Monte Carlo tree search  
play. We also introduce a new  
h value and policy networks.  
a 99.8% winning rate against  
champion by 5 games to 0. This is

# Implication of the application to AI

**AI is promising in probably all fields, but for that purpose AI needs freedom (randomness) which can be a threat to human society.**

“One can imagine such technology outsmarting financial markets, out-inventing human researchers, out-manipulating human leaders, and developing weapons we cannot even understand. Whereas the short-term impact of AI depends on ***who controls*** it, the long-term impact depends on ***whether it can be controlled*** at all.”

— S. Hawking, M. Tegmark, S. Russel and F. Wilczek (2014)

# Summary and prediction on survivability

