

AI, (Academic) Institutions and Theoretical Biology?

Warming up for the “Sandpit workshop – Beyond Equations”

Heidelberg, Thursday 1st October, 2026



Giovanni Sileno

g.sileno@uva.nl

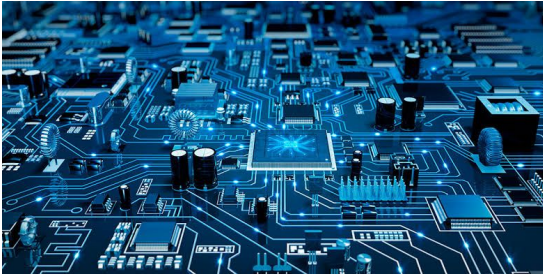
University of Amsterdam

1. How the research and teaching landscape are changing in my field due to AI use?

My field?

PhD
in AI & law

electronic engineering



research (amongst others) in

- normative modelling,
- cognitive modelling,
- socio-technical system design



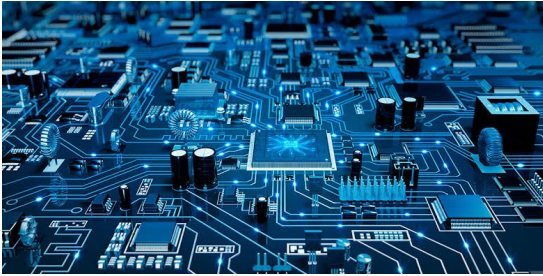
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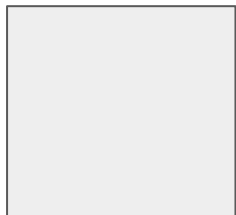
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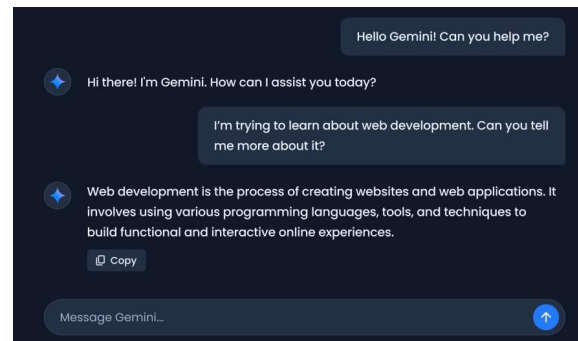
*let's say I deal with informatics, AI, and law, at large...
(but perhaps we could say I am somewhat of a cyberneticist)*

Typical use of LLMs

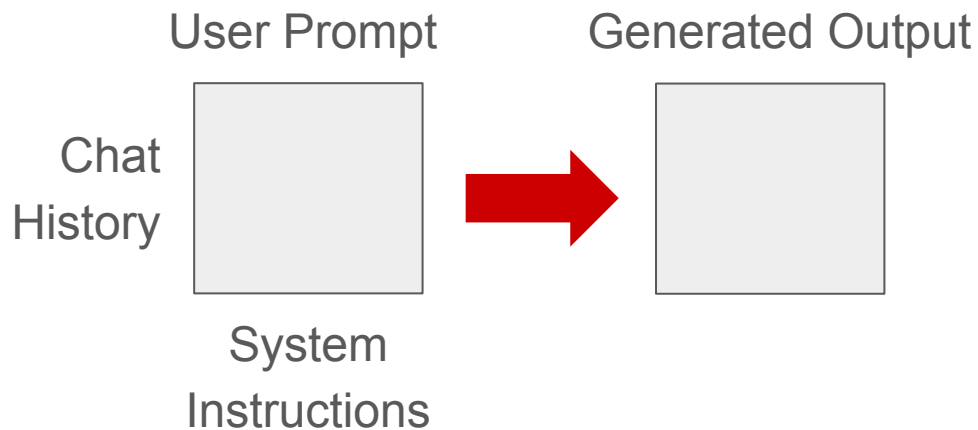
Input Prompt



Generated Output



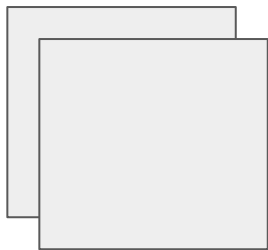
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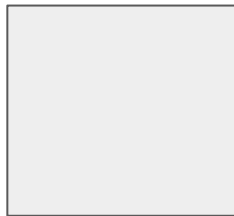
Typical use of LLMs for coding



Code



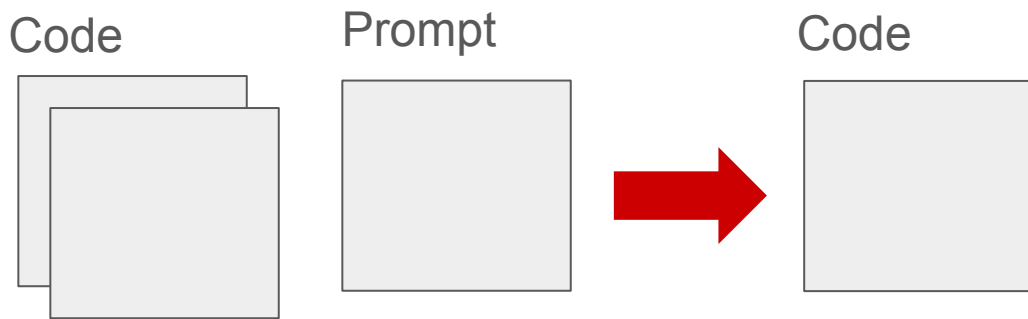
Prompt



Code

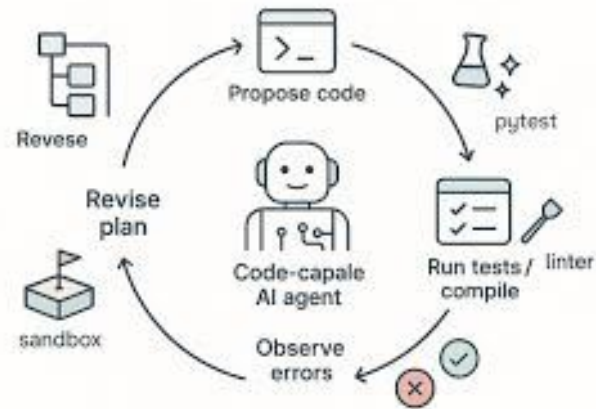


Typical use of LLMs for coding

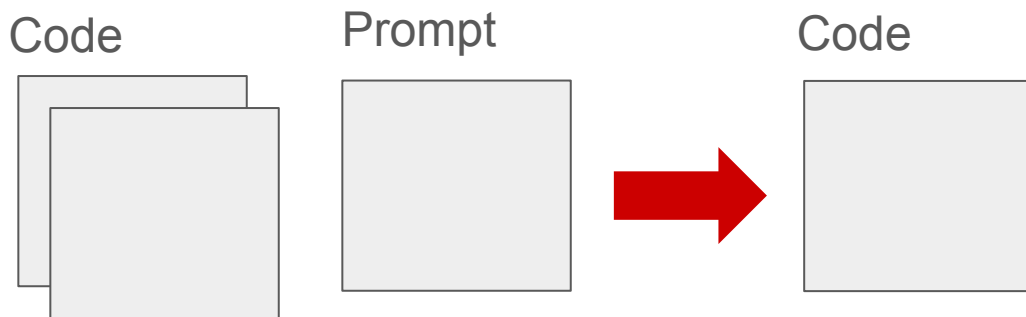


with Agentic AI:

- text for conceiving/designing the program,
- code for developing the program and
- code for verifying, validating, and deploying the program...



Typical use of LLMs for coding



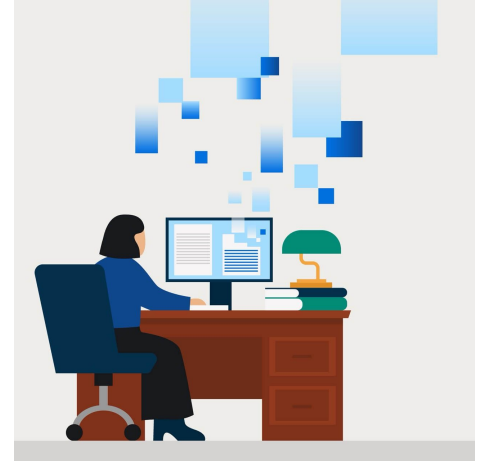
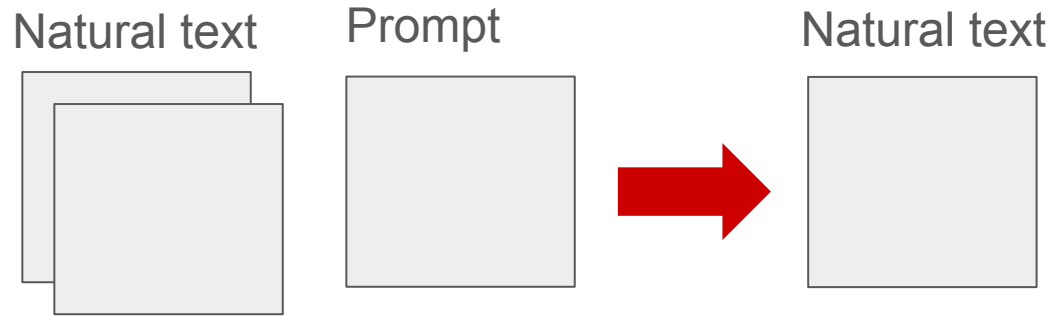
←  [r/learnprogramming](#) · 3mo ago
Low-Tune-1869

CS student here.. no one I know actually writes code anymore. We all use AI. Is this just how it is now?

I'm a CS student, and at this point AI does all the coding. Not most of it. All of it. My classmates and I don't write code anymore. We describe the problem, get a full solution/help from AI, and then our job is to understand what the AI produced.

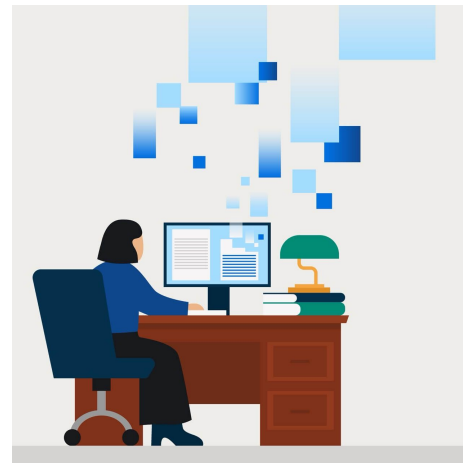
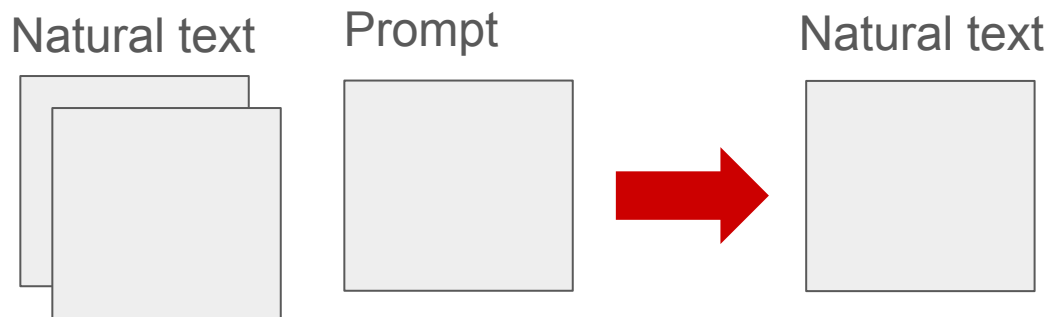
We read the code, follow the logic, but the solution itself is entirely generated. Writing code line by line just doesn't happen. I don't think anyone can write a method that return something in my class without ai

Typical use of LLMs in legal practice



plenty of legal tasks are based on texts.

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plenty of legal tasks are based on texts.
It seems LLMs offer a “general-purpose” instrument to
to perform almost all legal tasks...

both informatics and law are suffering a **strong disruption** due to the contemporary AI.

they are both disciplines about "codes", ie. text.

a "general-purpose" text-completion system can seemingly replace the surface-level activity of programmers and lawyers.

1. How the ~~research and teaching~~ landscape is changing in my field due to AI use?

2. Which changes are positive,
which negative?

Let's start with the positive...

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- removal/reduction of “tedious” parts of the story:
 - coding, particularly for interfaces and visualization
 - adjusting LaTeX, checking bibliography from human errors
 - supporting English language review (particularly useful for non-native speakers), making similar exercises for teaching

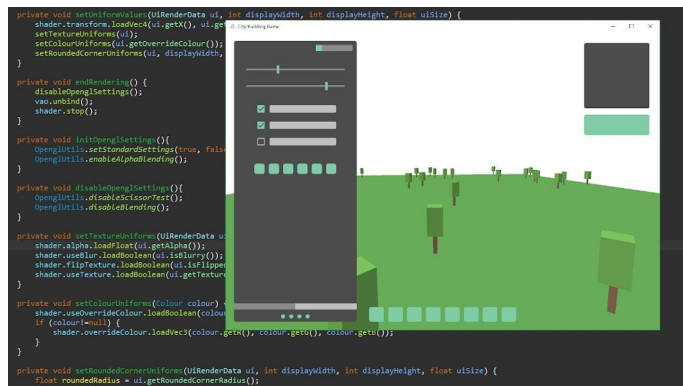
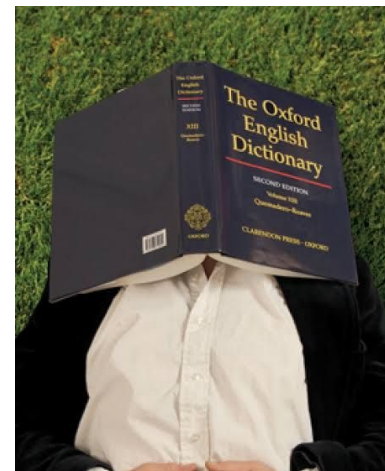


Table 1: Long table caption.

[illegible]

Let's start with the positive...

- a new tool for the researcher toolbox:
 - LLMs = *compression of (almost) all written human knowledge*.
 - use of LLMs = **approximate information retrieval**, finding access to knowledge on which to build to study (or inventing not existing truths).
 - **chatbots** = facilitating establishing connections through dialogue

De Volkskrant is een...

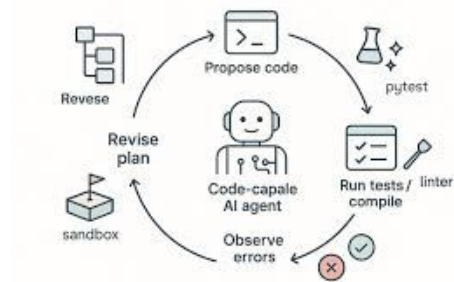


... van de belangrijkste
dagbladen van Nederland.



Let's start with the positive...

- a new tool for the researcher toolbox:



Agentic AI is however a completely different story,
as it entails an offload of *operational responsibility*

De Volkskrant is een...



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And now with the negative ones...

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- For **education** (and learning at large), the most fundamental problem is

UNGROUNDING

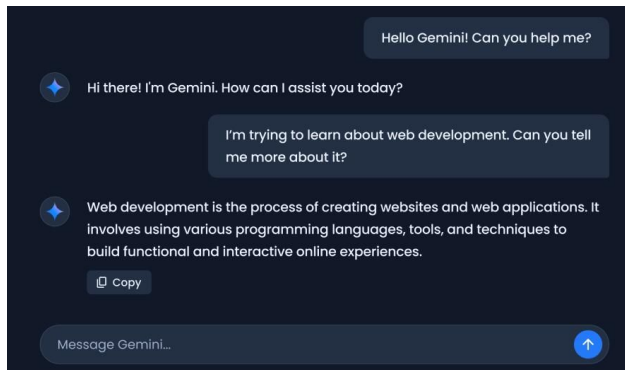


And now with the negative ones...

- For **education** (and learning at large), the most fundamental problem is

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- Risk of not “owning” problems: people just chase on the fly solutions to close a case. But deeper understanding does NOT come with *rubber-tape* solving.



And now with the negative ones...



- **Understanding** grows out of effort. **With no effort, there is no retention.**
- Without adequate protections (e.g. AI-proof assessments, incentives for social participation), students lose the very reason why they are at the university.

(I am neglecting the "applied" part of the story. I am here explicitly referring to the theoretical reflection, which may be associated to practice, but may also be constructed out of theory in itself).

And now with the negative ones...

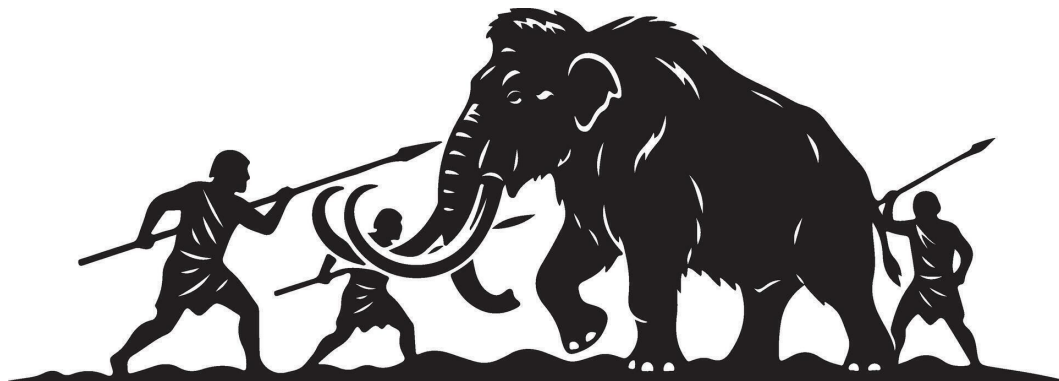
- For **research**, I see a dire future in the present setting.
- It is not only the
 - deluge of unmeaningful papers,
 - impossibility to distinguish signal from noise,
 - broken peer-review system,
 -

something fundamental has to be reconceived about the research venture.



Why we cooperate... in research?

- People naturally cooperate under two conditions:
 - they are not in extreme dire situations, i.e. actions are not critical.
 - it is difficult to achieve a result alone, but it is possible if others participate to the effort.



Why we cooperate... in research?

- People naturally cooperate under two conditions:
 - they are not in extreme dire situations, i.e. actions are
 - it is difficult to achieve a result alone, but it is possible to participate to the effort.
- With contemporary AI, the second part is disappearing.
- We are risking becoming **loners chasing for gold**.
- Part of this is further promoted by the incentive mechanism in place, rewarding individual achievements rather than participation to discourse.



a full redesign is necessary.

An alternative view?

- Perhaps we should re-appreciate that academia was meant to be a different space than the general socio-economic world...
 - beyond but responding to contemporary politics,
 - beyond but responding to material challenges
- A close, self-governing community, whose participants took a role more similar to a vocational choice, rather than being workers in a paper-mill, or in a degree-factory.



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(This setting had other more evident problems — co-optation and self-referentiality, above all — but let's overlook these for the sake of the argument.)

An alternative view? Mmm.

- This risks to be just a nostalgic dream if not supported by the political system.
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- This risks to be just a nostalgic dream if not supported by a
- The economic system does not have any direct incentives
- ***Why should we pay for training experts, if expertise is not necessary to make things function? (or at least appear to function?)***

(even more, cogs-in-the-machine are cheaper, more easily replaceable than experts, cf. the increasing role of tutors in university teaching rather than professors.)



An alternative view? Mmm.



- I do not expect **collective strategic intelligence** to emerge from the corporate world, we require collective agencies for establishing that.
- *Will our political systems converge to this objective?*

3. How this connects to
theoretical biology?

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theoretical biology?

In several ways!!!

As a “discipline”...

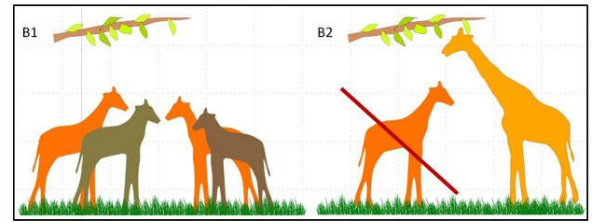
- With respect to learning and research, theoretical biology is as much as a discipline as the others, therefore it requires a readjustment of human processes around education and research.

As a “theory” . . .

- Theoretical biology can provide fruitful insights on what is happening now.
- *If you study **life** (the emergence and maintenance of living systems) you are touching similar functions as those we attempt to design or see emerging in “artificial” systems.*



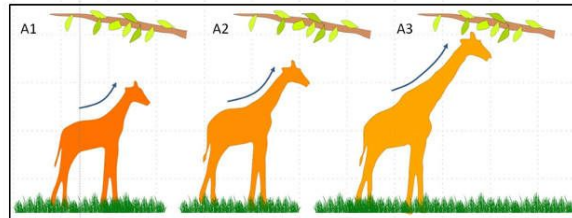
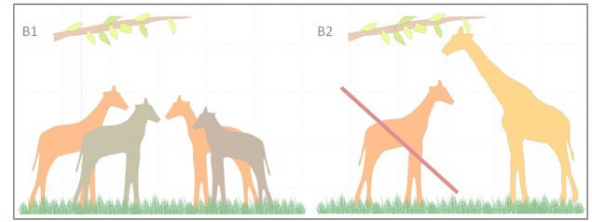
As a “theory” . . .



- Plenty of important “**ecological**” **questions** interact with theoretical biology, such as the *evolution of norms, of institutions, of science, and of algorithms*.

As a “theory” . . .

- Plenty of important “**ecological**” questions interact with theoretical biology, such as the *evolution of norms, of institutions, of science, and of algorithms*.
- Behavioural learning is however rather within the context of **memetics**, which share part of the mechanism of genetics (Lamarck vs Darwin again!).
- Yet, concepts like *ecological diversity*, and *exaptation* can be very important also to study the evolution of discourse (including preventing mono-cultures).



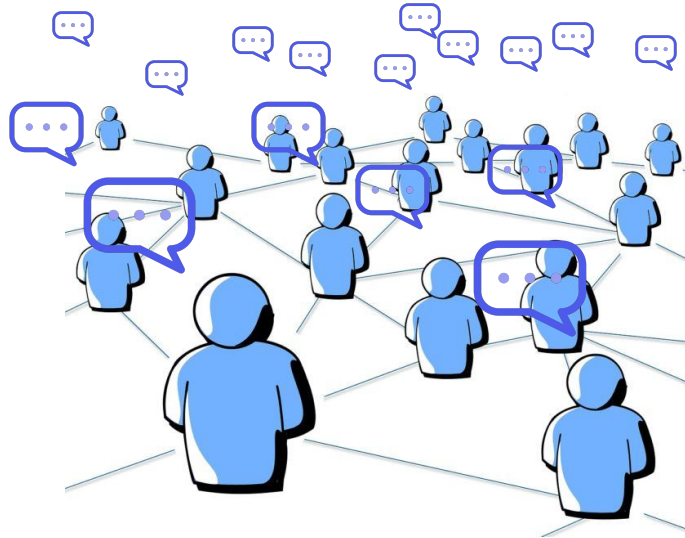
Beyond memetics

- However, a purely memetics view removes is the **materiality of the locutor's** experience, which is instead a central mechanism in biology (*at the end, you either [survive to] reproduce, or not*).



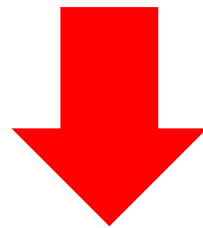
Beyond memetics

- In a recent paper, I attack Luhmann's cybernetic view on social systems (i.e. **social systems = communications**) to make clear the fundamental role of **values** for humans in determining **what is relevant** to be acted upon in the communication realm.



Beyond memetics

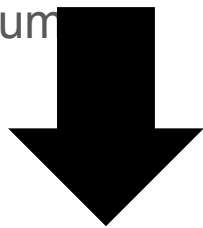
- For keeping ***control of relevance***, we should not allow machines to create their own domain of discourse; we need an explicit linguistic layer which is ***accessible to, understandable, extendible, meaningful*** and ***contestable by*** humans.



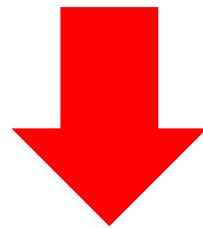
Humans ***select*** which
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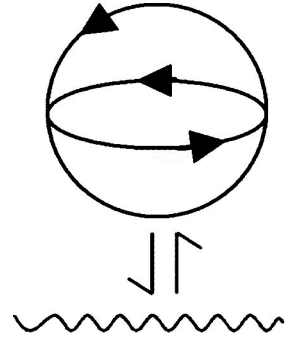
Simplicity (for humans)
as an intrinsic attractor



Humans **select** which
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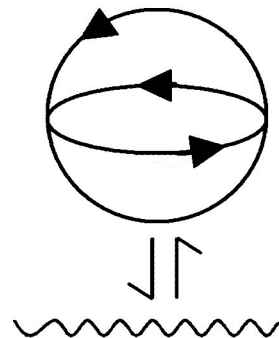
Beyond memetics, and beyond...

- Theoretical biology can also inform us on how to design human systems that function better in terms of **self-production** (e.g. *which functions should we integrate as collective agency to deal with climate warming*), as well as (dually) how to **prevent artificial systems to acquire the full traits of living systems**.



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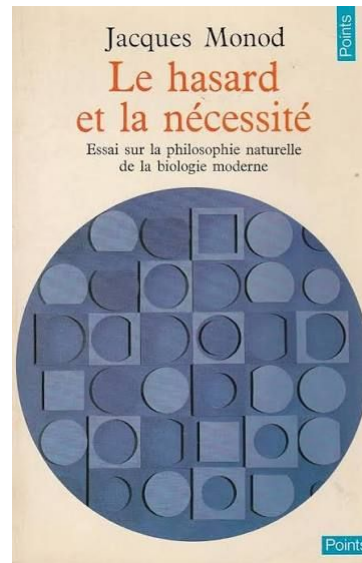
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*This is NOT an **AI-doomism** argument. It is not about AI, it is about the interaction between systems we set up and the world we inhabit. (It could be applied similarly to corporations and governments).*

Beyond memetics, and beyond...

- Applying Monod's terminology, survival can be seen as a **teleonomical property** of living systems. *If they wouldn't have that, they would not survive.*
- For humans, *in what sense artificial systems should be allowed to “survive” is a fundamental design (teleological) question*, that we should address **NOW**.



Two forms of survival

- We can think of survival as a **knowledge artefact** (in the meme domain), and in that case it is only a matter of *conservation*. This is not a problem per se.



Two forms of survival

- We can think of survival as a **knowledge artefact** (in the meme domain), and in that case it is only a matter of **conservation**. This is not a problem per se.
- We can think of survival as ***the activity of acquiring the material components for maintaining operations running*** (including the material counterpart of informational processes, such as memory and computing).
- *But which operations should be kept running? What should be reproduced?*

Natura artis magistra!

- From biology we know that all living systems are vessels of species. They have a **finite time for reproducing**, and their **actions** have only **local effects**.



Natura artis magistra!



- From biology we know that all living systems are vessels of species. They have a **finite time for reproducing**, and their **actions** have only **local effects**.
- *The existence of life (and death)* seems a central evidence that **decentralized entities** are the only viable way for enabling *life (at large)* to continue. *It appears as a teleonomical feature.*

Natura artis magistra!

- Contemporary AI, *within profit- or power-seeking human ventures*, favour naturally **centralizing and all-encompassing systems**. If that combines with *heavy material effects*, it can only get worse.
- We need alternative architectures!
Can theoretical biology help?



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