

Why ChatGPT isn't conscious—but future AI systems might be

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Credit: AI-generated image ([disclaimer](#))

In June 2022, Google engineer Blake Lemoine made headlines by claiming the company's LaMDA chatbot had achieved sentience. The software had the conversational ability of a precocious seven-year-old, [Lemoine said](#), and we should assume it possessed a similar awareness of the world.

LaMDA, later released to the public as [Bard](#), is powered by a "large language model" (LLM) of the kind that also forms the engine of OpenAI's ChatGPT bot. Other big tech companies are rushing to deploy similar technology.

Hundreds of millions of people have now had the chance to play with LLMs, but few seem to believe they are conscious. Instead, in linguist and data scientist [Emily Bender's poetic phrase](#), they are "stochastic parrots", which chatter convincingly without understanding. But what about the next generation of artificial intelligence (AI) systems, and the one after that?

Our team of philosophers, neuroscientists and [computer scientists](#) looked to current scientific theories of how [human consciousness](#) works to draw up a [list of basic computational properties](#) that any hypothetically conscious system would likely need to possess. In our view, no [current system](#) comes anywhere near the bar for [consciousness](#)—but at the same time, there's no obvious reason future systems won't become truly aware.

Finding indicators

Since computing pioneer Alan Turing proposed his "Imitation Game" in 1950, the ability to successfully impersonate a human in conversation has often been taken as a reliable marker of consciousness. This is usually because the task has seemed so difficult it must require consciousness.

However, as with chess computer Deep Blue's 1997 [defeat of grandmaster Gary Kasparov](#), the conversational fluency of LLMs may just move the goalposts. Is there a principled way to approach the question of AI consciousness that does not rely on our intuitions about what is difficult or special about [human cognition](#)?

Our recent [white paper](#) aims to do just that. We compared current scientific theories of what makes humans conscious to compile a list of "indicator properties" that could then be applied to AI systems.

We don't think systems that possess the [indicator](#) properties are definitely conscious, but the more indicators, the more seriously we should take claims of AI consciousness.

The computational processes behind consciousness

What sort of indicators were we looking for? We avoided overt behavioral criteria—such as being able to hold conversations with people—because these tend to be both human-centric and easy to fake.

Instead, we looked at theories of the computational processes that support consciousness in the human brain. These can tell us about the sort of information-processing needed to support subjective experience.

"Global workspace theories", for example, postulate that consciousness arises from the presence of a capacity-limited bottleneck which collates information from all parts of the brain and selects information to make globally available. "Recurrent processing theories" emphasize the role of feedback from later processes to earlier ones.

Indicators of consciousness

Different theories of consciousness suggest some basic properties we might expect a conscious system to have.

Recurrent processing theory

Input modules using algorithmic recurrence

Input modules generating organised, integrated perceptual representations

Global workspace theory

Multiple specialised systems capable of operating in parallel (modules)

Limited capacity workspace, entailing a bottleneck in information flow and a selective attention mechanism

Global broadcast: availability of information in the workspace to all modules

State-dependent attention, giving rise to the capacity to use the workspace to query modules in succession to perform complex tasks

Computational higher-order theories

Generative, top-down or noisy perception modules

Metacognitive monitoring distinguishing reliable perceptual representations from noise

Credit: The Conversation

Each theory in turn suggests more specific indicators. Our final list contains 14 indicators, each focusing on an aspect of how systems *work* rather than how they *behave*.

No reason to think current systems are conscious

How do current technologies stack up? Our analysis suggests there is no reason to think current AI systems are conscious.

Some do meet a few of the indicators. Systems using the transformer architecture, a kind of machine-learning model behind [ChatGPT and](#)

[similar tools](#), meet three of the "global workspace" indicators, but lack the crucial ability for global rebroadcast. They also fail to satisfy most of the other indicators.

So, despite ChatGPT's impressive conversational abilities, there is probably nobody home inside. Other architectures similarly meet at best a handful of criteria.

Most current architectures only meet a few of the indicators at most. However, for most of the indicators, there is at least one current architecture that meets it.

This suggests there are no obvious, in-principle technical barriers to building AI systems that satisfy most or all of the indicators.

It is probably a matter of *when* rather than *if* some such system is built. Of course, plenty of questions will still remain when that happens.

Beyond human consciousness

The scientific theories we canvass (and the authors of the paper!) don't always agree with one another. We used a list of indicators rather than strict criteria to acknowledge that fact. This can be a powerful methodology in the face of scientific uncertainty.

We were inspired by similar debates about animal consciousness. Most of us think at least some nonhuman animals are conscious, despite the fact they cannot converse with us about what they're feeling.

A 2021 [report](#) from the London School of Economics arguing that cephalopods such as octopuses likely feel pain was instrumental [in changing UK animal ethics policy](#). A focus on structural features has the surprising consequence that even some simple animals, like insects,

might even possess a minimal form of consciousness.

Our report does not make recommendations for what to do with conscious AI. This question will become more pressing as AI systems inevitably become more powerful and widely deployed.

Our indicators will not be the last word—but we hope they will become a first step in tackling this tricky question in a scientifically grounded way.

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