# What AI Cannot Do: Limits of Artificial Intelligence and the Role of Human Creativity

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## Abstract

Artificial intelligence (AI) is powerful at processing data, but it does not imagine, discover or decide on its own: it recombines what it was trained on, while humans notice new problems and invent new solutions. This paper examines six limits of current AI: imagination and creativity, discovery of new technology from a newly found problem, patience and adaptive execution, medicine discovery and scientific prediction, marketing strategy grounded in local context, and understanding of language, proverbs and situational meaning. For each, it contrasts how AI works (pattern learning from past data, responding only when prompted) with how people work (curiosity, waiting, retrying, lived experience). It concludes that AI is best used as a fast assistant to human judgment, not a replacement for it.

**Keywords:** artificial intelligence, creativity, limitations of AI, human judgment, drug discovery, context, language

## 1. Introduction

AI tools such as chatbots, recommendation engines and prediction models now write text, answer questions and analyse data in seconds, so many people assume AI can do everything a person can. It cannot. These systems produce results from data they were trained on; they do not wonder, dream or care about the outcome.

This matters for industry. When a client has a problem, the useful response is often something new: a new method, product or technology built around that problem. That step starts with a person who sees the problem, understands the client's situation and decides to try something that does not yet exist.

The paper argues that AI is a strong tool inside a human-led process. Sections 2 to 7 look at specific limits, Section 8 discusses how people and AI can work together, and Section 9 concludes.

## 2. Creativity and Imagination: AI Cannot Dream

Human creativity begins with imagination: people dream, picture things that do not exist, and connect ideas from unrelated parts of life. Current AI has no inner experience of this kind. A language or image model learns patterns from large amounts of existing material and produces new combinations of those patterns. The output can look original, but it stays inside what the training data made possible.

People can break away from past data. A designer can reject every existing example and start from a feeling, a memory or a personal goal. AI has no feeling, memory or goal of its own to start from; it needs a prompt, and the prompt comes from a human.

A common test is the chat window. When we ask a chatbot a question, it returns a trained answer. It does not think about the question by itself, it does not decide the question is wrong, and it does not come back later with an idea it formed in the meantime. Boden (2004) separates combining known ideas from changing the rules of a field itself; today's AI mostly does the first, and the second remains a human act.

## 3. Discovering New Technology from a New Problem

Much of technology begins with a problem someone notices. A client reports a failure, a team traces the cause, and then the team builds something new that did not exist before and that helps the client. This sequence has four human steps: spotting the problem, understanding why it matters, imagining a solution, and building it.

AI can support each step: it can search records, summarise reports and suggest known fixes. But it cannot start the chain. It does not notice a problem unless the problem already appears in the data it is given, and it cannot decide that a new kind of technology is needed when nothing in its training describes one. When a situation is truly new, the model has no pattern to match, and its answer tends to be a confident guess based on the nearest old case (Marcus and Davis, 2019).

In practice, this is the difference between *using* technology and *inventing* it. A person who meets a new industrial fault can inspect the machine, talk to the operators, test an idea and learn from the failure. The result helps the client and becomes new knowledge. AI can speed up the testing, yet the decision to invent comes from the human.

## 4. Time, Patience and Adaptive Execution

A chat-based AI works only in the moment of a request. It answers when asked and then stops. If a result will arrive in five minutes, the AI does not decide to wait, check again and act on what comes back unless a person or a program has been built to make it do so. A

human in the same situation waits, watches, and uses the time to think about what to do next.

The same gap appears in execution. People often make a plan, and the plan does not work. They try the next option, and if that fails too, they combine the two ideas and test the result. This loop of trying, observing, combining and trying again is how real projects move forward. AI can propose each step, but it does not own the goal, so it does not feel the pressure to keep going or the judgment of when to stop.

Some systems do repeat steps automatically, yet these are loops that humans designed, with limits humans chose. When something unexpected happens outside those limits, the system stops or fails. The person is the one who sees that the situation has changed and sets a new direction.

## 5. Medicine Discovery and Scientific Prediction

AI is a real help in medicine: AlphaFold, for example, predicts protein structures well enough to speed up research (Jumper et al., 2021). Even so, finding a new medicine is more than prediction. Scientists must choose which disease to target, design experiments, interpret surprising results, run clinical trials with real patients, and judge whether a risk is acceptable. Each of these steps depends on human responsibility and on evidence that does not yet exist in any dataset.

Prediction has a second limit. A model predicts what its data suggests, but a new disease, a new patient group or a new side effect is by definition missing from past data. AI can then give a confident answer that is wrong. Researchers must watch for this and test every prediction in the laboratory before trusting it.

So in medicine, AI is a fast screening tool. The idea of what is worth curing, the design of the study and the final decision to give a drug to a person stay with human scientists and doctors.

## 6. Marketing Strategy and Local Context

If we ask AI for a marketing strategy, it can list the usual parts: target audience, channels, budget, messages and timing. It can do this in seconds. The list, however, is general, because it is built from what is common across many cases.

People in a local area have aims, habits, worries and festivals that never appear in general data. A shopkeeper in a small town knows which families buy together, what a good price feels like, and which neighbour's word carries weight. AI knows only what it was trained on and what it is told. A human marketer who visits the place, listens to people and feels the mood of the market can turn a general plan into one that works there.

The human then also moves out of the plan's comfort zone: tries an unusual offer, observes the reaction, and adjusts. AI can analyse the numbers afterwards, but the decision to try something unexpected is human.

## 7. Language, Proverbs and Situational Meaning

Language carries more than words. Proverbs, idioms, jokes and local sayings mean different things depending on who says them, to whom, and in what situation. The same sentence can be advice, a warning, a joke or an insult. Humans read the situation through tone, relationship, shared history and culture.

AI works with patterns in text. It can often explain a well-known proverb because that explanation exists in its training data. It is less reliable with sayings that are local, spoken only in one region or family, used ironically, or mixed across languages. In these cases it may translate the words correctly and still miss the meaning. This is related to Searle's argument that handling symbols is not the same as understanding them (Searle, 1980), and to the point by Bender et al. (2021) that language models are trained on form, not on lived experience of the world.

People fill this gap naturally. They sense when a phrase is meant gently, when silence says more than speech, and when a saying should be answered with another saying. AI can analyse the sentence, and then it stops; the human understands the moment and responds to it.

## 8. Discussion: Human and AI Working Together

The limits above do not make AI useless. They show where each side is strongest, and the best results come when people lead and AI assists.

| Area | What AI does well | What humans do |
|---|---|---|
| Creativity | Combines known patterns quickly | Imagines what does not yet exist |
| New technology | Searches records, suggests known fixes | Spots the new problem and invents the solution |
| Time and execution | Repeats designed steps without tiring | Waits, retries, combines options, chooses a new direction |
| Medicine | Screens many candidates fast | Chooses targets, designs trials, takes responsibility |

| Area | What AI does well | What humans do |
|---|---|---|
| Marketing | Drafts general plans, analyses results | Reads the local market and takes unusual risks |
| Language | Translates and explains common sayings | Understands tone, culture and the moment |

Two practical rules follow. First, give AI the repetitive, data-heavy work, and keep problem definition and final decisions with people. Second, check AI output against real situations, because it can sound sure when it is wrong.

## 9. Conclusion

AI processes information faster than any person, but it does not dream, wait, invent or understand a moment the way people do. It answers from trained data, so it cannot by itself notice a new problem and create new technology for a client, discover a new medicine, shape a strategy for a local community, or read a proverb in its situation.

The future of work is therefore not AI against humans. People supply imagination, patience, local knowledge and responsibility, and AI supplies speed and scale. Organisations that keep humans in charge of the goal and use AI for the heavy lifting will get the best of both. Future research can test these limits with measured studies in specific fields such as industrial automation, healthcare and regional-language communication.

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These are cited from memory and not looked up online, so check each entry's details before submitting.

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