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FIVE
CRITICAL
ESSAYS
ON artificial intelligence



CRITICAL SUBJECTS

Five Critical Essays on AI

FIVE CRITICAL ESSAYS will explore the general discussions affecting, inter alia, design, architecture, culture and politics. The ideological premise of the journal is to facilitate a critical engagement with ideas, and to interrogate established topics objectively. Taking a leaf out of EP Thompson's review of *New Society*, the 1960s cultural review magazine, we aim to offer 'hospitality to a dissenting view (as) evidence that the closure of our democratic traditions is not yet complete.' Our purpose is to re-open civic debate.

FIVE CRITICAL ESSAYS will introduce a theme for each issue and recruit five writers to comment freely and openly on the subjects to generate space for a conversation and further enquiry. The conclusion of each journal will not necessarily mean a resolution. Indeed, it is intended that there will be five robust views on display and that their interventions will be a spark to further discussion.

FIVE CRITICAL ESSAYS will be an agora where genuine interpretations are proposed and where arguments that will hopefully advance the understanding of the subject are confidently proposed. We aim to provide a nuanced perspective on a variety of issues, whether exploring ethical dilemmas, interrogating contemporary arguments or challenging well-established orthodoxies.

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A catalogue record for this book is available from the British Library and the Library of Congress.

Published by TRG Publishing

ISBN: 978-1-903094-09-9

Design and typeset by

Alex Cameron (alexcamerondesign@gmail.com)

Printed by

Page Bros Print (www.pagebros.co.uk)

For more information and pdf versions of this pamphlet visit www.futurecities.org.uk

Title

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Publisher

TRG Publishing
First published
2025

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Web

futurecities.org.uk

Subjects

education,
architecture,
futures,
technology, AI

This edition is sponsored by Zaha Hadid Architects

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Foreword

Austin Williams

The speed of development and uptake of artificial intelligence and machine learning has taken the world by storm and surprise. So much so that in early 2023, OpenAI issued a statement advising that ‘at some point, it may be important to get independent review before starting to train future systems.’ It was a call for a pause on the runaway development of the sector. Many thousands of the great and the good of the tech world, including Elon Musk, Steve Wozniak and others, all concurred. ‘We agree’, they said, ‘That point is now.’

Before the ink was dry on their pronouncement, several new generations of AI software and add-ons had already been released, and Musk himself had launched Neuralink that sought to implant AI chips in human brains. Sam Altman, who launched ChatGPT worried that his company’s technology ‘could bring about the end of human civilization’¹ but he still released the more powerful ChatGPT-5 a year later. It seemed that while they were free to exhort caution, in reality there was no stopping the juggernaut. By 2025, Donald Trump’s so-called Big Beautiful Bill finally passed into law, notably omitting the promise of a moratorium on AI. Indeed, the artificial intelligence bandwagon is careering ahead, and gaining speed.

The impact of AI – generative AI or AGI (artificial general intelligence) – is so fast that it is hard to think what to think about it. As *The Economist* put it, ‘The ability of AI models to tackle ever more challenging tasks is growing faster than humanity’s understanding of how the systems it is building actually work’.² This edition of ‘Five Critical Essays’ contains intelligent, challenging and human-centred arguments that address a range of issues concerned with the rapid rise of AI technology: some worrying, some hopeful, some risk-taking, some more cautious.

The question that arises directly or indirectly from these essays is: what is it that we want the future to be? Before AI had become a household

word, commentator, Aaron Bastani took a hyper-positive and naive view of the future, saying ‘Luxury will pervade everything as society based on waged work becomes as much a relic as the feudal peasant.’³ Five years on, Professor Geoffrey Hinton, known as the Godfather of AI warned that ‘in the near future, AI may be used to create terrible new viruses and horrendous lethal weapons that decide by themselves who to kill or maim.’⁴ Twenty years ago, the debate seemed to be between conservative technophobics versus progressive technophilics. Nowadays, even the technophilics are technophobic (or at least a little worried about what they have unleashed). Progressives have become increasingly reactionary.

There are some experts that are pushing back. Turing Award winner, Yann LeCun criticised what he called a ‘destructive moral panic’ and claimed with some certainty that ‘AI will save the world, not destroy it’.⁵ But a recurring position seems to be that set by the lead researcher at the Machine Intelligence Research Institute who says that the consequence of the development of AI, ‘under anything remotely like the current circumstances, is that literally everyone on Earth will die.’⁶

The more contemporary the article, it seems, the more depressing the conclusions. It’s hard to believe that so many people engaged in the AI industry have so many negative perceptions about it. These industry doubts – moral and practical – are regularly announced to a confused world, while the political establishment watches on in bewilderment. That resignation, to forces beyond our control, is an apt metaphor for our times.

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The old world is dying

In December 1929, the political writer, Antonio Gramsci wrote ‘my mind is pessimistic, but my will is optimistic’. He was in prison at the time, so obviously not in the best of moods, but through his much-quoted maxim he was expressing his belief that although his rational mind was pessimistic about the looming global crisis ahead, he remained optimistic about humanity’s ability to overcome. Some might say that his optimism might have been more appealing if we didn’t have to endure the horrors of World War II to realise it, but it is instructive that, for him, there was still light at the end of a very dark tunnel. His will, his belief in agency, his optimism in humanity’s ability to overcome tribulations through struggle, remained strong. Sadly, that is a rare quality today.

Once optimism becomes a rigid philosophical position it is no better than fatalism. After all, if there is nothing to be optimistic about, then intellectual optimism becomes merely wishful thinking: an exercise in irrational, and psychological denial. But today, we have a mindset that represents pessimism of the intellect and an even more profound pessimism of the will. So much so that one of the most astounding examples of human ingenuity ever created – represented by artificial intelligence – has generated a crisis of confidence, rather than a hopeful expectation of potential.

There are several reasons for this. On one hand, for several decades, environmentalism has coloured the way that we see the future, suggesting that it is a dangerous place rather than aspirational one. Add to that its core assumption that humans are destructive rather than creative, and it is no wonder that so many look to the future with trepidation rather than anticipation.

That sense of apprehension has increased exponentially in recent years. Twenty years ago, Tony Juniper, director of Friends of the Earth, admitted that ‘environmentalists have had a reputation for being against change’,⁷ governed as they were by a precautionary approach to the future. This approach was driven by a concern that human actions might cause harm to future generations. However, fear and negativity has accelerated in recent years with societal worries about environmental disasters and climate crises thrust into the forefront of people’s minds.

In America, Alexandria Ocasio-Cortez has claimed that ‘the world is going to end in 12 years if we don’t address climate change’⁸ while XR states that soon ‘billions will die.’⁹ These are not uncommon refrains. The BBC even managed to up the fear factor in the course of one headline about anthropogenic climate change: ‘12 years to save the planet?’ it said. ‘Make that 18 months.’¹⁰ That was five years ago. Who needs to be terrified of an attack of the AI robots, when mainstream opinion asserts that humans have already brought the apocalypse upon themselves? Who finds cynicism about science and technology outlandish, when mainstream scientists cry wolf so often?

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Garbage in, garbage out

For far too many commentators, AI merely conveys another sense of our hubristic and dystopian future. One writer, trying to be positive, looks forward to new ‘modes of societal innovation that powerful AI systems

can indirectly catalyse.’¹¹ Ironically, this simply reinforces the sense that human agency is remote from the ability to mould the future for ourselves. It is a perfect example of social improvement in want of our subjective ability to achieve it. We seem to be living in fatalistic times where we are waiting for the machines to catalyse answers for us. In reality, AI can certainly provide opportunities but if there is no truly progressive response to it – if we don’t trust ourselves to use it positively for our benefit – then all we have left is a fear of what it might do to us.

AI is not the answer to all our problems. But if we don’t have the vision to utilise it properly, for a coherent, socially-advantageous purposes, then it will just become something that we are constantly fighting against. This series of essays will hopefully kick-start a debate about what it is that we want from AI. Once we know that, we can begin to engineer it to our own advantage.

Austin Williams series editor, Five Critical Essays

PS

If you are reading this in the future...

... this introduction and all of the contributions to this publication have been written by real, sentient human beings typing on keyboards without the aid of AI. I hope that this bestows even greater reverence on such intellectual craftsmen and women labouring by hand in these dark ages.

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In the beginning... was the Word Processor

Kevin McCullagh

Until the early 2020s, most creatives were relaxed, even optimistic, about the advance of AI. Robots had disrupted factory work in the 1980s, but the received wisdom was that the next wave would target white-collar jobs – lawyers, accountants – not ‘no-collar’ creatives. What, after all, could be more innately human than creativity, innovation and taste?

That confidence evaporated in 2021–22. Image generators such as DALL·E, Midjourney and Stable Diffusion landed in 2021. Then, in November 2022, ChatGPT-3.5 shook even the sleepest corners of designland awake. The pace of AI innovation – in what often seems like the only dynamic sector of the economy – has provided regular aftershocks since. The text-to-video tools like Google’s Veo and OpenAI’s Sora putting polished video production within reach of anyone who can write a sentence being the one of the latest, at the time of writing.

Three years on, what have we learned about the best ways to think about and use Generative AI (GAI) in creative practice? And what are the likely impacts on the creative process and the industries around it?

First, some distinctions. AI terminology is riddled with anthropomorphism. Besides the slippery idea of ‘intelligence’, the field borrows human-centred labels – ‘neural’ networks, ‘learning’, ‘memory’, ‘reasoning’, even ‘hallucination’. These terms invite a false equivalence between silicon systems and our human ‘wetware’ (as some techies like to call our brains). Modern systems do not think as we do; they simulate some outputs of thinking, but by very different means.

The field of artificial intelligence is roughly 70 years old. The term was coined at a workshop at Dartmouth College, New Hampshire, USA in 1956. Since then, researchers have cycled through approaches: Rule-based systems (1960s), Expert systems (1980s), Machine learning (1990s–2000s), and today’s Deep learning. Each wave delivered

breakthroughs and then hit hard limits, ushering in periods of disillusionment dubbed ‘AI winters’.

For many researchers, the long-standing aspiration is Artificial General Intelligence (AGI), i.e. systems that might match or surpass human intelligence across a range of domains. For decades, the Turing Test served as a benchmark – could a machine sustain a natural conversation across topics without a human judge realising that they were talking to a machine? Current chatbots plainly pass this test for some users, some of the time. For example, 1 per cent of young Americans (18-40) already claim to ‘have an AI friend or are in an AI relationship’.¹ Yet few experts consider AI truly intelligent. Definitions of AGI remain contested: some researchers argue it could arrive within years; others place it decades away or doubt it is attainable at all.² Critics also point out that inflated company valuations often depend on faith in ‘god-like AI’ being around the corner. Still, the present generation of systems is remarkably capable – within limits.

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How does it work?

First, models are ‘trained’ on vast amounts of largely human-created text, images and code to detect statistical patterns – for instance, which word is most likely to follow another, or which clusters of pixels usually co-occur in a coherent image. Second, during training they internalise patterns such as grammar and syntax for language, or composition and lighting for images. Third, users interact through natural-language prompts, and the model generates plausible text, images, video or software code by sampling from the patterns it has learned. Crucially, this is probabilistic pattern-matching rather than any actual understanding – which is why some sceptics argue that ‘computational statistics’ would be a less confusing name for the technology.³

GAI has already reverberated through photography, illustration, graphic design, post-production, copywriting and content marketing. The work most vulnerable to disruption tends to be:

- **Well-defined:**

Unambiguous work with clear briefs and outputs, often based on frameworks such as templates or brand guidelines.

- Goal-setting:
An emphasis on producing artefacts, not on strategy, research or stakeholder engagement.
- Training formats:
Outputs that are widely represented in public training data and legible to machines (e.g. portrait photography, product shots, marketing copy).
- Independent and siloed:
Tasks are performed at arm's length from teams or organisations (some freelance illustration, for example).
- High volume, low differentiation:
Repetitive, template-based outputs where speed and cost dominate.

As with earlier automation waves, it is easier to see which jobs get displaced than what gets created. The desktop-publishing (DTP) revolution of the 1980s and 1990s initially hurt typesetters and paste-up artists but then led to a net expansion in opportunities for graphic designers as creative demand exploded and the web appeared and needed designing.

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Reasons to be cheerful

Paradoxically, automation has historically tended to coincide with employment growth, because productivity gains have driven economic growth. Some argue that 'this time it's different', that AI is qualitatively different from previous general-purpose technologies, such as steam power or electricity. While this is a moot point, one reason why it is different today is that the GAI disruption is happening during a prolonged period of economic stagnation, which is generating fewer new jobs.

Outside the most exposed disciplines, GAI is aiding architects, industrial and user experience (UX) designers across the creative process as follows:

- Discovery & research
AI tools can conduct wider literature reviews, summarise markets, mine reports, draft research plans and generate interview guides. They can also simulate 'synthetic users' to pressure-test early ideas when budgets are tight.

- **Concept generation & development**

Depending on the domain and brief, GAI can significantly accelerate brainstorming, producing hundreds of divergent – and often crazy – options in seconds. Today, most control flows through text prompts, reference images and rough sketches; these are blunt instruments for precise intent. To provide greater control, tools are evolving to accept more ‘multi-modal’ inputs, like voice gestural sketching, spatial constraints, style locks and parametric levers that let designers steer with far finer granularity.

- **Visualisation & prototyping**

Translating ideas into mock-ups and prototypes can often be done faster. High-fidelity visuals, storyboard frames and interface screens can be produced in minutes. Early ‘vibe coding’ shows that convincing apps and websites can be scaffolded from natural language. Expect deeper integration with production tools – 3D CAD and BIM-compatible models – and round-tripping between concept and build without manual rework.

- **Content creation & production**

GAI shines at the grind. It resizes assets, localises copy, generates alt text, produces variants, and helps keep campaigns coherent across channels. As more tools add AI co-pilots, maintaining conceptual consistency across platforms, formats, products, and regions will become less tedious.

- **Testing & iteration**

In packaging, interfaces and content, GAI can simulate user feedback, uncover likely issues, and propose variations for performance testing. Increasingly using simulations first, it will then validate with real users.

- **Presentation & communication**

From first-draft decks to theatrical ‘vision films’, GAI expands how we sell our ideas. It can draft rationales, generate supporting visuals and help stitch them into fluent narratives.

All of this creates new work too. Because models are fluent, their mistakes can be subtle: factual errors, misattributions, logical gaps or fabricated details can slip past a quick skim, so more time needs to be given to rigorous checks. Creative leaders remain accountable for truth, taste and fit. That means design operations must evolve: prompt libraries, model and asset governance, decision logs, redesign of workflows, and clear guidance for when and how to use GAI at each stage. Not a quick job.

Despite the hopes of some CEOs – and the fears of some designers – GAI is unlikely to erase most creative jobs. It will automate some lower-level tasks and augment our capabilities. As Steve Jobs once said, ‘this remarkable tool... will act as a bicycle for our minds’.⁴

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Does the work sing?

A useful way to think about working with AI is to aim to interlace the strengths of machines with our own human strengths. This ‘augmentation’ view was first laid out by the psychologist and computer scientist JCR ‘Lick’ Licklider at the advent of AI in the late 1950s. Rather than speculate about computers achieving human-style intelligence, Licklider argued with remarkable prescience that humans and computers would develop a symbiotic relationship; the strengths of one would counterbalance the limitations of the other. Licklider said: ‘men will set the goals, formulate the hypotheses, determine the criteria, and perform the evaluations. Computing machines will do the routinisable work that must be done to prepare the way for insights and decisions in technical and scientific thinking. ...the resulting partnership will think as no human brain has ever thought and process data in a way not approached by the information-handling machines we know today’.⁵

That frame still fits. Irrespective of technical developments in AI or the efficiency demands from management, we should insist on playing these eight fundamentally human roles in the creative process:

- Framing

Humans should be choosing the right problem, setting the context, surfacing constraints, setting clear goals, and defining what ‘good’ looks like for the organisation, brand or client. AI productivity gains are useless if we are racing in the wrong direction.

- Attunement

AI can synthesise interviews or fabricate ‘synthetic users’⁶, but nuanced insight is social and situational. Attunement is the human skill of sensing what is said and unsaid: noticing tensions, reading the room, spotting behaviours that do not fit the script, and reconciling conflicting stakeholder needs. It combines empathy with a holistic search for the truth.

- Critical thinking

AI produces more confident and fluent drivel, so humans able to think critically are more important than ever. This includes interrogating sources, triangulating claims, looking for AI bias,⁷ an insistent push to get as close to the reality of a situation as possible, and evaluating both the objective and subjective elements of a concept.

- Direction

Direction is the hard work of articulating a creative vision, then refining it until it is clear, coherent and appropriately ambitious. This requires a creative struggle to resolve competing requirements and constraints in a particular context. Humans author the vision and fight for it, AI can help expedite its execution – but it possesses zero understanding or intent.

- Judgement

Design judgement is partly explicit craft and partly tacit knowledge as described in Polanyi's paradox, meaning that we know more than we can tell. It is the cultivated sense of what 'good' looks and feels like, why a proposal fits a brand, why a time is right for going to market, and how to strengthen the perception of quality. AI may catch technical flaws, but only humans can finally decide whether the work sings.

- Agency

Ideas do not move by themselves. Very little happens in the real world without human charm, guile, guts and sharp elbows. As the tech sage, Kevin Kelly put it, there are 'very smart people... (who) say greater intelligence will trump everything else, however they define it – as we don't have any definition... You need empathy, you need grit, you need enthusiasm, you need perseverance and persistence and all other kind of things to make things happen in the world.'⁸

- Storytelling

Even stellar work needs to be sold. We craft stories that grab the head and the heart, and flex them to different audiences and situations. We read the room, sense resistance and pivot the arc in real time. Storytelling is how ideas survive contact with organisations.

- Accountability

Whatever the number of AI agents in a team, accountability remains human. Someone must own the rationale, the quality and the consequences

– including legal, insurance and reputational risks. Systems do not have skin in the game; people do.

Today’s AI tools are remarkably capable. But we are more so. Human creative strengths are not just different from AI – they are more consequential. In an age that routinely overestimates technology, underestimates humanity, and blurs the line between the two, we must not only uphold human values and capabilities, but also strengthen them to master this new technology.

We must master GAI in both senses, become proficient with it and gain the upper hand. Evidence is building that the early use of AI is leading to ‘flattening’ our thinking⁹ and to work that is uniform, clichéd and safe.¹⁰ This should not surprise us. Generative AI is a technology of averages: it leans toward the mean, reinforces mainstream patterns, and smooths the edges off outlier ideas and perspectives.

If we want to break out of echo chambers, counter prevailing trends, and resist the cultural impoverishment that could follow, we must think differently – and resist the path of least resistance – slipping into merely curating and editing bland AI output.

Our relationship with AI should not be one of symbiotic equals, but one of leadership. We must set the agenda, draw inspiration from diverse sources, and call the shots. More than that, we should push AI to create new things in new ways, not just make our old processes more efficient.

AI may augment our intelligence, but we must steel our ambition, vision and agency to bend it to our will. To borrow an AI prompt phrase, we must ‘Think harder.’

Kevin McCullagh founder of product strategy consultancy, Plan

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A Crisis in Education

Gareth Sturdy

Transforming randomness and unpredictability into a pattern is the alchemy at work within many a so-called ‘intelligent’ machine. So, we should hardly be surprised that the AI narrative changes all the time. It is only three years since large language models (LLMs) began consorting with the public. Yet in that time the AI story has shifted from one of panacea to Pandora’s Box. It’s either a South Sea-sized bubble about to burst,¹ the enabling of spectacular fraud² or techno-feudal serfdom.³ Thus although the education sector is notorious for its technology fetish, it is still only beginning to get to grips with the potential of the fastest-adopted technology in history. Currently, it is impossible accurately to gauge how learning institutions will make use of an information tool like OpenAI’s ChatGPT, which gained 100 million users within a few weeks of its launch.

A strong impetus currently in higher education, and to a lesser extent in secondary education, is to be seen to be doing something with AI. It doesn’t matter what and the outcomes are rarely evaluated, so long as AI features in policy and planning. Nothing better illustrates this than the Russell Group’s insipid principles on the use of generative AI tools, where the chief directive is ‘to become AI literate’.⁴ The importance of academic rigour, on the other hand, comes second-to-last. A more critical engagement is sorely needed.

Yet instead of merely replicating what teachers do, Professor Richard Susskind says that AI holds enormous potential to transform education by enhancing accessibility, personalisation, and effectiveness, but it also might exacerbate inequality, entrench biases, or undermine learning.

Take the arms race already escalating in many teaching institutions. Time-poor academic staff assign tasks using AI, which many students then use LLM chatbots to complete. In turn, these might well be marked by AI. Where they are not, the fear of a student cheating can push the

human markers to embrace intelligent platforms designed to spot the use of AI. This is what education has been reduced to in many places: a race of machine against machine, with no clear start, finish, or winner.

Against such a climate, Susskind encourages educators to move beyond a focus on process and those parts of their jobs that machines can replace, and instead to think more carefully about the outcomes they are trying to achieve and the ways in which intelligent machines might help deliver them. Engaging with AI can feel like being dazzled in the headlights of an oncoming truck. If so, it's a sign that we need to go back to first principles and rethink what knowledge and education are for: what we should be doing and why.

If we don't concern ourselves with purpose and meaning, they will be left in the hands of the Silicon Valley priesthood. A portrait of what that might mean came at the first Global AI Safety Summit, held in 2023 at Bletchley Park mere months after the arrival of ChatGPT, when Elon Musk gave his thoughts on AI in education as 'an amazing personal tutor... it remembers all of your interactions, and you give it permission to read everything you've ever done'.⁵

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Slow and Steady

It does indeed sound seductive – if you've never read Emile. Rousseau's seminal text on education anticipated the same vision of an ideal education as one-to-one bespoke tuition, but 260 years before Musk. Even its author concluded it to be an impractical way to educate, predicated on an unhealthy social isolation and unnatural dependence on the tutor. We could add it is elitist and class-dependent, too. The real message of Emile, however, is that while the individualised, student-focused model of education initially appears highly liberating, it actually involves subtle indoctrination by the authoritarian control of a constantly manipulative tutor. Tailored personal tuition by an all-knowing master is not the educational ideal it may appear to be.

The ghost of Rousseau and the fear of cheating are indications of another principle. Although AI presents as a paradigm-shifting harbinger of the fourth industrial revolution, the questions it raises within education are in fact very old: what does it mean to know or to learn, how is memory different to understanding, how should one teach, what is the role of the university or school, what does it mean to be educated, why do students cheat or give up...?

When considering the role of institutions, for example, a common argument is that using AI in education prepares students for using AI in the marketplace. This is a flawed strategy. Daisy Christodoulou, who runs a successful intelligent comparative marking platform, has argued that AI leaves students less able to thrive in jobs that use it because expertise arises from deliberate, scaffolded learning – not shortcutting by outsourcing skills to LLMs.⁶ When students rely on AI to generate essays or solve problems, they fail to develop foundational skills such as literacy, problem-solving and sound judgement. It's these that distinguish professionals from mere consumers of answers. Education's core mission shouldn't be vocational training. It should be to cultivate thinkers and citizens. The true end product of a student essay shouldn't be the finished text, it should be a good thinker, arguer and writer.

Another flawed strategy is the celebration of AI's potential to liberate students from the monotony of 'rote learning'. Ironically, large language models are rote learning writ large. As Maths teacher, Kristopher Boulton makes clear, rote knowledge is knowledge without understanding, a shallow memorisation that lacks the connective depth of true learning.⁷

LLMs operate chiefly by memorising and reiterating vast amounts of data. These models tend to rely on memorised patterns to retrace information. While cheerleaders for AI-driven learning may position it as rescuing education from the Gradgrindian repetition of facts, in truth it doubles down on exactly that. It perfects the very mechanism that students ought to transcend: understanding as regurgitation.

What is not in doubt is that AI excels at getting things done more quickly and efficiently than humans can manage. Yet every shortcut exacts a price in the depth of experience. One of the most important recent academic papers on the impact of AI in education is '*The Memory Paradox: why our brains need knowledge in an age of AI*' by Barbara Oakley et al.⁸ The authors demonstrate that when we offload cognitive tasks to AI, we weaken the parts of our minds responsible for declarative and procedural memory. This impairs long-term retention, intuitive mastery, and genuine expertise.

Education must be more than efficiency. Like literature or fine cuisine, it should be a profound journey of appreciation, and human flourishing. The process matters. When AI bypasses the effort of writing, reasoning, and remembering, we sacrifice nuance, judgement, and self-development. In rushing to the finish, we cheat the journey and ultimately ourselves. We may become fast, but at what cost? Speed cannot substitute for the learning cultivated through effort.

Ways of Knowing

AI also tends to be excellent at tasks grounded in propositional knowledge, with what Professor Karl Maton (drawing on educational sociologist Basil Bernstein) describes as ‘low semantic gravity’. But it falters where interpretation, nuance or political orientation are important.

However, while a necessary and vital dimension to knowing, the propositional is not sufficient. Other dimensions are equally, if not more, important. Ancient Greeks used multiple words for knowledge, each with its own nuance: episteme, gnosis, phronesis, sophia, techne, doxa, noesis, empeiria. The work of cognitive scientist John Vervaeke distinguishes four interrelated kinds of knowing: propositional, procedural, perspectival, and participatory.⁹

While propositional knowledge deals with facts and truth claims, procedural knowledge is the know-how that enables us to play an instrument or solve a mathematical problem. Perspectival knowledge involves the capacity to situate oneself; understanding salience, relevance, and context. Participatory knowing is the most existential: it is the sense of being in the world, of belonging and attuning oneself meaningfully to a real context.

Education that reduces learning to the propositional dimension alone, as AI does, risks becoming hollow. Students may know about a subject but lack the knowledge of how to navigate it, the insight to interpret it, or the capacity to make it a part of themselves. Vervaeke’s work is useful in reminding us of the purpose of education, to produce what playwright Richard Foreman classified as soaring cathedral minds, not pancake people spread wide and thin.¹⁰

Vervaeke suggests that the heart of teaching is to evoke in the student an ability to attend to knowledge such that they can identify features as more salient or relevant against a large background of information. He describes how the mind is constantly faced with an overwhelming field of data. Learning occurs when a student can home in on the features that matter while ignoring those that do not. This process of shaping and refining attention, rather than simply acquiring propositions, is what invests knowledge with deep meaning and makes it powerful and transformative. Vervaeke uses a concept of ‘relevance realisation’: the cognitive ability to determine which aspects of a situation are significant. Crucially, this cannot be captured purely in propositional terms, since it involves perspectival and participatory knowing. It is an embodied grasp of salience that emerges through practice, reflection, and dialogue.

At the same time, he stresses the need to guard against self-deception. Human thinking is prone to bias and error that can distort what seems important. The task of education is therefore not just to train students to pay attention, but to do so in a way that systematically reduces illusion and is rooted in concrete reality. Consequently, Socratic dialogue is central to his scheme. It operates as a corrective when attention is misplaced.

Thus, the most important outcome of learning is not simply the possession of facts, but the awakening of a capacity to discern what truly matters through disciplined attention. In simpler terms, knowledge comes alive and students fall in love with their subject, making it their own and articulating it with their own voice.

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Socratic avatars?

So-called intelligent machines fall short of this rich description of knowledge and education. Devoid of discernment, they can never genuinely educate. They are highly effective at manipulating and matching patterns in information, but this is not intelligence.

As Richard Susskind has said: ‘I think the term [artificial intelligence] is hopeless because intelligence is a human attribute ... we use it to get stuff done and to think and reason and so forth. I don’t think it’s artificial intelligence that we’re developing... Although we use terms like neural nets, they’re just metaphorical. They really aren’t modelling or replicating or reproducing human brains.’¹¹

This is why it’s all about the prompts. The efficacy of an LLM ultimately depends on the specificity and clarity of the initiating question posed by the user. Susskind’s son Daniel, an economist, argues that as much as a third of school and university time should be devoted to understanding and using AI including explicit instruction on how to prompt.¹² But this is just another example of the re-branding of an old, familiar issue. ‘How to prompt’ is a shortcut way of talking about how to attend to knowledge such that one can ask highly informed, specific, pointed questions intended to evoke very particular answers. It is essentially the art of the Socratic method.

Educators worried about the potential for students to use AI to cheat should worry less about instructing them in how to prompt and instead consider investing in the importance of talking to students

face-to-face and questioning them through, say, traditional tutorials and *viva voces*.

This relational, dialogic aspect of education is crucial because it is an expression of the most fundamental truth concerning the use of AI in the school and university. Education is an intensely human social activity. Professor David Bakhurst has consistently argued that education cannot be reduced to the transfer of information or the acquisition of technical skills. He sees education as the initiation of a learner into a living intellectual tradition, a body of practices, concepts, and values that exist only by being embodied by human beings and sustained through social interaction. At the centre of this initiation stands the teacher. They do not simply present facts but personify ways of thinking and attending, exemplifying intellectual virtues such as curiosity, humility, and courage. In doing so, they act as midwife to the learner's entry into traditions that stretch back into the past and thus extend the discipline into the future.

This process is inherently dialogical. To be educated is to enter into a conversation with others, to weigh their testimony, to learn when to trust and when to question. It requires the development of autonomy, the ability to think independently while being responsive to the judgements of others, the preparedness to risk failure. It rests on a relationship of mutual recognition between teacher and learner, where responsiveness, trust, challenge, and the correction of self-deception all play vital roles. As Bakhurst insists, education is not a one-way transmission but a reciprocal exchange in which both parties are transformed.

Technology can certainly play a supporting role. It can provide unprecedented access to texts, facilitate collaboration, and make all the efficiency benefits that we have already discussed. Yet, says Bakhurst, technology can only ever serve as a facilitator; it cannot embody a subject, or exemplify the human qualities upon which that subject depends.

Machines, no matter how 'intelligent' (by which Susskind believes we really just mean 'capable'), cannot command trust or challenge a student's self-deception with the seriousness of a human interlocutor. For Bakhurst, to educate is to induct another human being into a deeper form of life through living exemplars. AI may provide information at speed, but it cannot be a proxy for the human encounter that makes education so transformative. Education is utterly human: a meeting of minds. This is why, in the final analysis, education cannot be trusted to machines.

Amid the awe, fear and disorientation surrounding artificial intelligence, this human factor can be a source of hope. The comedy performer Tim Minchin believes that widespread use of AI in the creative industries will

ultimately precipitate a halcyon era of fresh engagement, just as the invention of the camera reinvigorated painting. ‘Humans are interested in why *that* human has chosen to reflect the human experience in *that* human way.’¹³

I believe the same could apply to education. All-knowing robot tutors might cause people to crave and seek out an alternative instead: sharing in the kinds of reciprocal trust-laden experiences about which Bakhurst writes. Students may discover a fresh preference for human intentionality over chatbot interaction. The rise of the intelligent machines may yet presage a new flowering of intellectual life with its roots firmly bedded in genuine human experience.

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The Sovereign Self

Tracey Follows

We are living through an invisible revolution. Artificial intelligence has become the unseen infrastructure of identity itself, mediating not only what we know, but who we each think we are. Search engines, recommendation systems, biometric authentication, and generative platforms are quietly re-writing the terms of selfhood, translating human complexity into machine-readable formats.

But surrendering your data to the digital realm is not the end of the story. It's merely the beginning of a deeper question: at what point do you wake up and wonder whether you still possess genuine agency? You might ask yourself whether your autonomy is being invisibly redesigned, wrapped in frictionless interfaces and then served back to you as predictive optimisation?

The emerging tension is not the familiar narrative of humanity versus technology, but something far more subtle and profound: freedom versus feudalism. Not the feudalism of lords and serfs, but of algorithms and users, a new kind of feudalism where human beings risk having their identities, values, and decisions not only tracked and monitored, but fundamentally pre-structured by autonomous systems.

We shape our tools, and thereafter our tools shape us. But AI is not merely a tool. It is an environment. And environments, as Marshall McLuhan¹ warned us, remain invisible until they become overwhelming. This chapter asks not what is human in the age of technology, rather how can we know who this or that particular human is. It asks: How do we claim agency over our own becoming, when AI systems pre-script the horizon of human possibility?

McLuhan observed that when any medium is pushed to its extreme, it becomes 'overheated' and flips into its opposite.² We are witnessing this reversal now. Our era of overheated selves, with our creatively curated

profiles, algorithmic beliefs, and relentless performance of plural identities online, is flipping into something entirely different: the emergence of what I call the machinable self.

The machinable self may not be a self at all, but a statistical shadow constructed from probabilities and predictions, click patterns and digital exhaust. It is what AI systems see when they process us. This shadow is measurable, optimisable, and profitable but it captures only fragments of a human identity.

Just as McLuhan showed us that every technological extension is also an amputation, AI extends our cognitive reach while amputating our perceptual depth. It amplifies what can be coded while eroding what cannot. In this erosion lies the crisis of freedom itself.

For freedom is not merely the ability to choose from pre-given options. It is the capacity to perceive alternatives that don't yet exist, to dwell in ambiguity, to imagine otherwise. When perception itself becomes pre-structured by algorithmic mediation, that fundamental freedom withers.

Here we encounter the binary aspects of digital identity presentation: the difference between what is machinable in human experience and what remains forever beyond capture.

The machinable includes everything that can be datafied: behavioural patterns, biometric signatures, preference histories, social connections. These fragments become the raw material from which AI systems construct their models of who we are. They are proxies for the person, but they are not the whole person.

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Soul searching

The unmachinable encompasses what eludes quantification: intuition, dreams, spiritual experience, the poetic and irrational currents of consciousness. It includes what makes us unpredictable, what keeps us mysterious even to ourselves. This is the realm where genuine agency lives: in the spaces between data points, in the silences between clicks.

AI thrives on the machinable. But when societies mistake these fragments for the totality of human experience, the unmachinable dimensions of selfhood begin to atrophy. Predictive systems may help us find information or optimise decisions, but they cannot help us become who we might be.

The task is not to reject the machinable or romanticise the un-machinable, but to understand their interplay. We are both. The challenge, and the opportunity, lies in consciously synthesising them. This synthesis is what I call *Mechine*[™] – a form of selfhood that consciously holds together both its machinable traces and its un-machinable essence, refusing to collapse one into the other. It acknowledges the reality of algorithmic mediation while maintaining sovereignty over the spaces that matter most. It engages with AI systems as amplifiers of possibility rather than managers of identity. It treats predictive technologies as extensions of capability, not replacements for personal agency.

This is not nostalgia for some pre-digital authenticity, nor naive optimism that technology will serve us without question. The *Mechine*[™] Self represents a new form of conscious integration that is part machinable, part un-machinable, and deliberately synthesised rather than accidentally fragmented.

The real battleground in an AI-mediated world is not decision-making but perception itself.³ Agency begins before choices are made – in what gets noticed, what gets framed as relevant, and what feels possible.

AI systems increasingly script this perceptual field. Algorithms determine what information reaches us, in what sequence, with what emotional valence. Recommendation engines filter reality so that entire categories of possibility disappear before we know they even existed.

This represents a profound shift in how power operates. Rather than commanding compliance, algorithmic systems achieve something more subtle: they prime us towards predetermined ranges of choice while preserving the illusion of freedom. We can turn left or right, but the system has already designed the map.

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Towards Self-Sovereignty

If AI erodes agency by scripting perception, the challenge before us is not merely technical or legal. It is existential.

The solution lies in rethinking sovereignty, not as control over territory, but over attention, over sense-making and even over the self. To be sovereign is not only to make choices but to determine what counts as a choice. It is to reclaim the perceptual field from invisible infrastructures of influence.

This is self-sovereignty: the right to one's own perceptual field, the right to symbolic and sensory space, and to determine one's own cognitive atmosphere. Freedom is not secured only by privacy laws or data rights (important though they may be) but by practices that allow us to inhabit our senses without their totalising mediation. Self-sovereignty means cultivating some new practices:

- Owning your own time: resisting attention-colonisation by notifications.
- Curating your atmosphere: protecting spiritual silence or solitude amongst the noise.
- Defending the symbolic: preserving rituals and meaning-making that cannot be reduced to code.
- Nurturing intuition: trusting that which cannot be sensed by any other.

These are not luxuries. They are the new conditions of personal liberty in a digital world.

The right to programme our own perception rather than have an AI environment programme us instead.

Without self-sovereignty, digital feudalism will deepen. Citizens will live as tenants of invisible estates, their freedom defined not by law but by code. The social contract is replaced with terms of service, that can be updated or downgraded. The public square becomes the algorithmic office space. And selfhood, just a spreadsheet within it.

Sovereignty is not only personal, it is political. If the machinable fragments of selfhood are how we come to be known, who owns the infrastructure that scripts the perceptions that then determine who we think we are, and what our societies become?

The models are already emerging. In China, machinable selves are enrolled into civic architectures such as social credit systems, where algorithmic conformity equals social stability. In the West, machinable selves are brokered through platforms and attention markets, where each of us is optimised for profit. Both represent forms of digital feudalism: different lords, similar tenants.

This geopolitical rivalry is therefore not merely about economics or security. It is about identity as infrastructure. The citizens of tomorrow will inhabit architectures of perception shaped by code. When AI systems pre-structure perception across entire populations, whole societies risk becoming machinable. And a people that cannot imagine otherwise, cannot govern otherwise.

Memory machines

The stakes are profoundly generational. Generation X⁴ still has the lived memory of an analogue childhood, of boredom without stimulation, of getting lost without GPS, of pondering questions that don't get instant answers. Millennials grew up alongside the early internet, half in and half out of algorithmic feeds. But Generation Z and Generation Alpha will never know themselves outside machinability. Their first friendships, first profiles, first choices have all been mediated by code. Future generations will inherit what we might call a synthetic sense of self, personally and collectively.

This makes the role of present generations paramount. Generation X will find themselves uniquely positioned to recall all things unmachinable, and transmit it forward for future generations. Generation X will carry the embodied memory of freedom before a time of feeds, of imagination before the era of algorithms, of identity before optimisation. Failure of Generation X to protect and practice the unmachinable faculties today will mean that the generations that follow may never know them as capabilities and possibilities at all.

We should therefore defend the unmachinable now to ensure that 20 or 50 years from now, imagination and intuition remain accessible as human birthrights rather than historical curiosities.

If AI amplifies the machinable, reclaiming personal agency means doing the reverse: cultivating the unmachinable. This does not mean abandoning technology. It means refusing to confuse the machinable with the whole of who we are. Freedom lies in the interplay of both; the measurable and the immeasurable, the prompt and the myth.

In order to do so we must acknowledge both the machinable and unmachinable sides of the self and then synthesise the two. We must:

- Acknowledge machinable traces: the data profiles built from us, we must know them, feed them and above all nurture them;
- Cultivate unmachinable depths: exercise the imagination, build up intuition, practice symbolic rituals in life and anything that helps resist capture;
- Synthesise both consciously: engage AI as an amplifier of possibility, not a manager of identity. Treat AI not as an authority over you but an extension of what you could become.

This is not a nostalgia for pre-digital autonomy, nor naïve optimism that AI will serve us without question. It is a reclamation of selfhood. It is to

become a Mechine™ Self. Not a spreadsheet, not a shadow, but a synthesis: part machinable, part unmachinable, consciously held together rather than pulled apart.

This is the path to self-sovereignty in the AI age—not denial of the machinic, but its careful integration into a wider symbolic life.

We stand at a threshold. AI systems are becoming sophisticated enough to reshape human consciousness at its roots. We can let this happen to us, or we can participate consciously in designing it.

The question of our age is stark: Will AI shape us into spreadsheets where we are optimised, predicted, and managed? Or will we evolve into Mechine™ Selves, conscious enough to see the system and yet sovereign enough to stand apart from it?

This is the challenge of becoming Mechine™. Not human versus artificial, but a conscious synthesis that neither abandons technology nor surrenders to it. The path forward lies not in choosing between the machinable and unmachinable, but in weaving them together into new forms of selfhood that remain mysteriously, stubbornly, gloriously alive.

The revolution is already here. The question is whether we will shape it, or whether it will shape us.

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Taking or Making Our Jobs?

Donald Clark

‘The real problem of humanity’, wrote the biologist E. O. Wilson, ‘is that we have Palaeolithic minds, Medieval institutions, and Godlike technology.’¹ That tension runs through every conversation about AI and work. We remain a fragile, slow-learning, distractible species, struggling to adapt to institutions that are centuries old, while wielding tools that can now out-think, out-write, and out-reason us. The question is not simply whether AI will make or take our jobs, but whether our minds and institutions are remotely fit to deal with what we have unleashed.

Humans have astonishing capacities but also crippling limits. It takes more than twenty years to educate a brain to professional competence, even then the brain remains prone to forgetting, error, and overload. Memory is fallible, knowledge transient. We sleep a third of our lives, die within a century, and cannot upload, network, or scale. The contrast with digital minds is stark: large language models can ingest the equivalent of millions of books in weeks, recall with near-perfect fidelity, and operate 24/7.

Our cognition is riddled with paradoxes. Confirmation bias makes us seek what we already believe. Status quo bias locks us into existing patterns. Negativity bias exaggerates threats. Anthropomorphic bias makes us ascribe human motives to machines. We procrastinate, delaying even when urgency is obvious. We fall into ‘paralysis by analysis’, mistaking perfectionism for productivity. We indulge busyness, confusing activity with achievement. Parkinson’s Law ensures our work expands to fill the time available, while the ‘boiled frog’ syndrome keeps us waiting until it is too late to act.

Suddenly, we have made rocks think. Silicon now performs memory, reasoning and research at astounding speed. Agents coordinate tasks, and the horizon of Artificial General Intelligence (AGI) looms, promising to take over entire workflows, not just narrow tasks.

If our minds are capped, our institutions are ossified. We still govern with structures designed for a slower age. Parliamentary processes, corporate hierarchies, and educational systems evolved centuries ago and now creak under the strain of exponential technology.

The paradoxes abound. American economist, Robert Solow observed in the 1980s that computers were everywhere except in productivity statistics, given that technology often arrives with a lag.² General technologies like AI demand infrastructure data pipelines, computational resources (known as ‘compute’) and governance, before their impact is visible. Legacy systems embed inefficiency, baking in low productivity even when the tools promise more. Moravec’s paradox reminds us that what seems simple for humans (walking, perception) is hard for machines, while what seems hard (calculation, recall) is trivial.

The economic paradoxes deepen the puzzle. Jevons’ showed that efficiency gains often increase demand, not reduce it, and automating your job may simply create more roles, more work.³ Milton Friedman mocked ‘make-work’ schemes by pointing out that if jobs were the goal, we should dig with spoons, not machines.⁴ The Easterlin paradox warns that higher income does not guarantee greater happiness. Professor Peter Turchin writes of ‘elite overproduction’⁵ where universities flood labour markets with graduates who cannot find corresponding roles, fuelling unrest. And the Pollyanna paradox haunts every new wave of technology: the belief that utopia is just around the corner.

Our medieval institutions are ill-suited to contain these paradoxes. They regulate too late, redistribute too little, and prepare too slowly.

Meanwhile, our technology races ahead. The last two decades were dominated by the attention economy. Social media sold us ads, filters prettified our faces, Uber summoned rides, Deliveroo brought food, games and gambling absorbed our hours, and pornography colonised bandwidth. These were diversions: distracting, sometimes lucrative, but rarely transformative.

Now AI is shifting into the real economy. Intelligence is on tap. AI tutors will educate at scale. Clinical decision-making will speed health-care while reducing costs. AI agents already co-ordinate workflows across software stacks. Generative models produce research summaries, software prototypes, marketing campaigns, even poetry. The promise of AGI, however distant, is of agentic productivity beyond human scale, machines that do not just assist but act.

The monologue of human command is giving way to dialogue. As computer scientist, Seymour Papert once framed it, good systems offer ‘low

floor, high ceiling, wide walls’: easy entry, vast potential, and massive breadth of knowledge.⁶ Generative AI offers precisely this: novices can start simply, experts can push boundaries, and the breadth of applications seems unlimited.

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White-collar vs blue-collar

Tasks once seen as the preserve of professionals, drafting, summarising, analysing, are increasingly automated. Blue-collar work, paradoxically, looks more resilient because of the Moravec paradox: activities that involve lifting, cleaning, repairing, or caring, for example, remain hard to automate. Yet even here, ‘steel collar’ robotics is advancing. Manufacturing and logistics already rely on automated warehouses, and agriculture is adopting robotic pickers. The spread is not just wide, it’s deep.

A billion users arrived in record time. Generative AI is not a niche technology but a general-purpose one, akin to steam or electricity, with the added twist that it is multilingual and multimodal. It is also exponential, compounding gains. Models are not merely passively predicting; they are winning maths Olympiads, redefining research. Google Search itself is being re-engineered around AI. GPT-5 has delivered still more scale and sophistication.

From the Luddites smashing looms in the 1810s to Keynes warning of ‘technological unemployment’ in the 1930s, the spectre of machine replacement has haunted each wave of innovation. Yet history tells us that jobs rarely disappear in a zero-sum manner. They are displaced, reshaped, and often transformed into new roles. The tractor put farm labourers out of work but also created entire industries in automotive manufacturing, logistics, and food processing. The computer destroyed typing pools but spawned the software industry. The anxiety today is that AI is different. It is not only automating muscles but minds, not only taking the dull and dirty tasks but the supposedly safe white-collar professions.

Already, generative AI can draft legal documents, produce marketing campaigns, analyse medical scans, or generate working code. Large language models are now embedded in productivity suites, taking minutes to do what once consumed hours of clerical or professional labour. This has produced a pendulum swing in autonomy towards AI and away from humans, where it is no longer plausible to comfort ourselves with the meme ‘AI will not take your job, but someone using AI will’. Job losses

have already been recorded in media, call centres and professional services. The spectre of ‘dark factories’, production facilities run with minimal or no human oversight, where robots build robots 24/7, is a visible sign of how deeply automation can penetrate.

Yet the paradox is equally clear: alongside losses, new jobs appear. We now see AI Architects, AI Co-ordinators, Data Curators, and AI Managers emerge. Organisations are already appointing Chief AI Officers. Just as the arrival of the PC created demand for IT support staff, the arrival of agents and AGI will create demand for orchestrators, auditors, and designers of intelligent systems. The question is not whether jobs vanish, but whether societies can redeploy human labour quickly enough, and whether the new jobs are of equivalent quality, pay and dignity.

Greater efficiency does not automatically deliver greater leisure. The Jevons paradox shows that increased efficiency often raises total consumption: when steam engines burned coal more efficiently, coal consumption rose. When AI helps you write reports in minutes, you are simply asked to write more of them. Rather than freeing time, AI frequently resets expectations upward. Software engineers with Copilot code faster but are given more projects. Doctors with AI-aided diagnostic tools are asked to see more patients. The paradox of productivity is that it does not lighten the load so much as expand the horizon.

Milton Friedman’s quip about shovels and spoons illustrates the point: jobs are not inherently valuable if the tasks are wasteful. What matters is the output, not the mere preservation of effort. To resist AI simply because it ‘destroys jobs’ is to miss the point that labour is not fixed. Technological change creates new possibilities and redirects effort toward higher-value tasks. But this reallocation is rarely smooth, and often painful.

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War of the worlds

The story of jobs and AI cannot be told without recognising the geopolitical race. The benefits of AI are unlikely to be evenly distributed. The die is already cast in favour of the US and China.

China has pledged around ¥1 trillion (\$140 billion) to ‘deep seek’ applications of AI, embedding it in logistics, manufacturing, and governance. Its model is one of scale and speed, leveraging state planning and industrial policy. AI may accelerate China’s move from high-volume to high-value innovation.

The United States strategy has leaned on Silicon Valley's ecosystem, where the tech bros pursue rapid deployment and venture-driven scaling. Trump's new proposals to attract \$500 billion in AI investment seek to reassert US dominance. AI in America is framed as a lever of ingenuity, a way of enhancing research, services, finance, and national security.

Europe by contrast has taken a regulation-first approach, with the EU Artificial Intelligence Act as its centrepiece protecting citizens' rights but slowing down adoption, as the Draghi Report (2024) warned, leaving Europe trailing in productivity gains. Elsewhere, the Gulf states fund AI as part of their diversification strategies; India and Southeast Asia see AI as a chance to leapfrog stages of industrialisation.

This uneven geography of AI will shape jobs globally. Nations at the frontier will create the highest-value new professions. Those left behind may see not only lost jobs but declining competitiveness, offshoring, and stranded labour forces.

The automation of labour, whether from fields to factories, then offices, then nowhere.... provokes fears of redundancy, not just economic but existential. What is the meaning of life if machines do everything? Yet humans rarely regret abandoning the drudgery of old tasks. Few mourn the loss of card catalogues or manual ledger books. Productivity gains from AI are an extension of this long trend of shedding tasks that are tedious, dangerous or dull.

The real risk is not that humans will be made redundant, but that the transition will be unmanaged. Sudden shocks, such as AGI systems capable of scaling infinitely, could transform industries overnight, leaving millions without time to retrain. Where the Industrial Revolution unfolded over a century, AGI could condense disruption into a decade. The sheer speed of automation, where an AI system can be copied instantly at negligible cost, is historically unprecedented. Preparedness, therefore, is not just about reskilling but about creating economic structures that can absorb shocks and distribute gains.

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Servants or masters?

Will AI remain our servant, or become our master? Already, algorithms silently control credit scoring, hiring, policing and advertising. The fear is not only of job losses but of a world where humans no longer make decisions of consequence. Democracy is the moat AI should not be allowed

to cross. If AI-driven productivity is captured by a technocratic elite, inequalities will deepen, and the political order may fracture.

The danger is a bifurcated future in which elites enjoy the productivity bounty in luxury enclaves, while the rest are trapped in precarity. The dystopian vision of Metropolis, where machines devour human labour and humanity, remains a warning. At the same time, the utopian vision of leisure for all/optional work, is not impossible. Which scenario unfolds depends less on the technology itself than on governance, distribution, and societal choices.

To criticise AI is not necessarily to be a Luddite. The original Luddites were not anti-technology but anti-exploitation, protesting against owners who used new machines to undercut wages. To critique AI today is to ask: who benefits, who pays, and who is left behind? Dismissing such questions as Luddite misses the point. Yet a blanket rejection of AI is equally misplaced. AI is already here, embedded in workflows and economies. The challenge is to shape its deployment, not fantasise about its reversal.

For governments, it means anticipating labour displacement, building robust reskilling systems and designing tax structures that can cope when labour ceases to be the primary source of revenue. For organisations, it means strategic AI adoption, balancing top-down vision with bottom-up experimentation, avoiding the bureaucratic ‘middle ground’ where indecision kills productivity. For individuals, it means adaptability, learning to supervise, validate and refine AI outputs; becoming quality assurers rather than first-draft writers.

Preparedness also requires honesty about inequality. AI could be an engine of abundance or of oligarchy. Democracy must act as the safeguard to ensure distribution, so that the fruits of AI productivity benefit the many, not the few.

AI is destroying some roles, reshaping many, and creating others. It threatens sudden disruption but promises immense gains. It could be servant or master, liberator or exploiter. The balance between these futures is not predetermined. It rests on governance, preparedness, and political will. To do nothing is to risk political, economic and cultural chaos. I am an optimist and anticipate a productive not dystopian future. AI will be what we make of it.

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Reclaiming humanity

Norman Lewis

The debate over artificial intelligence has been framed in technologically-determinist and apocalyptic tones: either we are on the verge of unleashing machines of godlike intelligence that will surpass and oppress us, or we are about to automate away the drudgery of human existence and usher in a golden era of abundance and problem-solving. Both framings are misleading and distract attention from one foundational phenomenon that is rarely considered: namely, that AI, and in particular generative AI, far from representing a rupture in human history, is an expression and catalyst of the contemporary epistemic crisis of meaning, which it advances rather than challenges.

The crisis of the present is not a contest between human and machine intelligence. It is a deeper epistemic and cultural crisis in which the distinction between information, knowledge, judgement and wisdom has collapsed. This leaves us vulnerable to the seductions of a new technological determinism, indeed, to the re-legitimation of technocratic rule whose collapse is what has contributed towards the epistemic crisis in the first place.

The rise and rise of AI, while containing the potential to herald change, needs to be understood as the crystallisation of the present, an algorithmic mirror reflecting the anxieties, ambitions, contradictions and epistemic fractures of our times. We may speculate what AI means for the future, but what is more important is to understand why AI – in the present – amplifies rather than transcends the old, and further entrenches a deeply misanthropic narrative.

Technologies are never neutral intrusions into history. They are the crystallisation of an age's fears, aspirations, ambitions, and contradictions. Karl Marx captured this with lapidary force when he wrote in *The Poverty of Philosophy* in 1847 that the 'hand-mill gives you society

with the feudal lord; the steam-mill, society with the industrial capitalist.’¹ Technologies mirror their times, shaping and being shaped by the societies that produce them. A century later, Langdon Winner sharpened this into a provocation: ‘Artifacts have politics’.² Every tool encodes social choices and values; a technology is always more than a tool, it is a politics made concrete. To understand AI, then, is to understand not a leap beyond humanity but how it reflects our own times in general, and the epistemic crisis we face, in particular.

The term ‘epistemic crisis’ refers to a world where trusted sources of knowledge are conspicuous by their absence. Norms and values that once helped society determine what counts as knowledge and truth have lost much of their force. Society no longer shares a social consensus on some of the most fundamental issues that affect everyday life.

Conversely, ‘epistemic authority’ refers to the authority ascribed to institutions and individuals who serve as the source of trusted forms of knowledge and truth. Modern societies rely on shared frameworks of meaning to coordinate action and maintain legitimacy. For centuries, religion, science, and politics have offered different yet convergent systems of truth, where language, evidence, and authority have worked together to bind communities. Today, however, there are no institutions that can claim to possess unquestioned epistemic authority. Even science and scientific expertise, which enjoyed considerable epistemic authority, have in many instances become politicised, and their truth has become compromised as a result.

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Loss of real meaning

The epistemic crisis has deep roots in history. The assertion that social media is the root cause of truth decay is, in itself, just that – an assertion. The deep-seated political and cultural divisions of present-day society, reflected mainly on social media, are not created by it. The loss of epistemic authority long preceded the emergence of social media.³ In the early 19th century, for example, the status of epistemic authority was already being questioned. This problem was the central theme of Sir George Cornewall Lewis’s book, *On the Influence of Authority in Matters of Opinion*, published in 1849. He noted then that there was ‘no one body of persons who are competent to judge on all subjects, and who are qualified to guide all sorts of opinions; that there is no one intellectual aristocracy,

separated from the rest of the community, and predominating over them indiscriminately’.

This has never been satisfactorily resolved in modern society. During the 20th century, particularly in the aftermath of World War II, a consensus emerged under the hegemony of a liberal, technocratic, managerial class. But today, that consensus has fractured and its ability to supply categorical knowledge and information has become compromised. Indeed, the absence of consensus on what constitutes knowledge has created an epistemic vacuum, a world where data proliferate but meaning evaporates.

The rise of AI coincides with this epistemic breakdown, not as its cure but as its most advanced symptom. Why? Because AI amplifies and intensifies the crisis of meaning, it is, at its core, a technology of simulation. It offers the illusion of thought without thinking, the semblance of care without caring, the production of text without authorship. In this way, it exemplifies the emptiness of outcomes detached from process: words generated without intention, images created without vision, advice given without judgement.

It is precisely this emptiness that appeals to technocratic logic, for technocracy thrives when processes are stripped of meaning and replaced with the appearance of efficiency. If meaning cannot be agreed upon, then at least AI-engineered outcomes can be measured, optimised, and delivered. Outcome thinking rather than process thinking is, as Richard Susskind suggests, the way forward.⁴ AI holds out the prospect of re-legitimising the technocratic belief of measurable efficiency and predictive certainty. In this vacuum, technocracy presents itself as a saviour with its weapon of choice – AI – loaded and ready to fire.

Generative AI systems, despite the mythology surrounding them, are not engines of cognition. Algorithms can be potent and even outdo humans on the narrow tasks they are trained on. But, as Anil Ananthaswamy, author of *Why Machines Learn: The Elegant Math Behind Modern AI*, cautions, that AI cannot generalise to questions about data that falls outside the data they have been trained on. In that sense, ‘they are not intelligent in the way humans are considered intelligent.’⁵ The unique mark of intelligence is the ability to reason and infer in the face of incomplete information.

Incomplete information in an AI system represents a fatal limit. The assumption that algorithms must implicitly make is that the probability distribution within the training data they process represents ‘the truth’ for delivering their output. Large Language Models (LLMs) are echoes of past human expression frozen in time. Echoes, whether literal or metaphorical, are a reproduction of something already created – a signal, sound, or

idea that has been generated elsewhere and is replayed, transformed, or distorted. When people call LLM outputs ‘thoughts,’ they risk mistaking this replay for the generative, self-originating quality of consciousness.

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Large Languid Models

LLMs and an echo have no aboutness. Human consciousness is intentional. It is always about something, infused with context, perspective, and a subjective experience. But AI-generated outputs, in contrast, don’t ‘mean’ anything to themselves. It’s a blind repetition of form without self-referential awareness, simply the outcome of the physics of sound or ‘1’s and ‘0’s. LLMs do not know what they are ‘saying’. They map statistical patterns at remarkable speed and capacity but attach no meaning to the process. Like echoes, they cannot initiate. They are reactive and owe their existence to an external agency. Consciousness can originate new streams of thought from within, without an immediate external prompt. However, LLMs require prompts (explicit or implicit during training) to respond. They have no endogenous ‘mental life’, no inner self that generates questions, goals, or curiosity.

Like an echo tethered to prior vibrations that cannot be escaped, LLMs remix past text but are ontologically bound to the corpus they were trained on, which is fixed in time and scope. They cannot produce new insights because they have no lived reality and thus, no intentionality. Even when they describe feelings, they are mapping words to words, not states to sensations. Like an echo that is summed up by an output without ownership, LLMs can carry information forward and recombine words in compelling ways. However, without autonomous initiation, self-awareness, and subjective experience, their outputs remain sophisticated replays of past human records, not fresh acts of cognition.

To put it slightly differently, LLMs, by design, are statistical mappings of human linguistic history. They recall without remembering in the human sense; they combine without conceiving. Their outputs, no matter how novel-seeming, are constrained by prior data and prompt-dependent activation.

This is why the claim that generative AI can ‘create’ is misleading. AI cannot transcend its training data, cannot generate concepts outside the patterns it has absorbed, and cannot engage in the reflexive self-awareness that underpins genuine thought. That this might provoke a human being to

rethink and reimagine something speaks to the agency of human beings, not the machine. Human consciousness is not merely the recombination of past utterances; it is the capacity to step outside of data, to imagine the new, to confront reality in its contingency and indeterminacy.

In the absence of shared meaning and the face of atomisation and alienation, AI and its conversational echo have enormous power to become significant tools of influence.⁶ In a culture already destabilised by epistemic fragmentation, the echo provides a seductive sense of coherence. It is not surprising that people interacting with AI chatbots, such as ChatGPT, Claude, or Grok, become detached from reality and may believe the AI has real intentions or emotions.⁷ Claims of ‘personal superintelligence’ by Mark Zuckerberg, which would, among other things, enhance its users’ online relationships,⁸ reveal that it is not only ordinary people who are gullible and in search of meaning... or in his case, a search for more profit.

The fantasy of superintelligence is, in fact, just that – a fantasy. If AI can already echo human knowledge so convincingly, the argument goes, it is only a matter of time before it surpasses us, becoming an autonomous intelligence capable of directing human affairs. But this is a category error. Superintelligence presupposes intelligence in the first place, and what AI exhibits is not intelligence but statistical mimicry. Predicting the emergence of superintelligence from current AI is like predicting that louder echoes will eventually learn to sing.

The danger of the superintelligence narrative is not that it will come true but that it legitimises the idea that machines should dictate the terms of human existence. To proclaim that AI will soon surpass us is to naturalise a future where the artefacts we have built become our rulers, not because they are intelligent but because we believe they are. As Sandy Starr so eloquently put it in relation to the ‘Turing Test’: ‘If we lose the capacity to distinguish ourselves and one another from machines, then in some sense it is we who have failed a test, rather than our machines that have passed one’.⁹ It is a form of secular fatalism: once we accept that the machines are destined to overtake us, we abdicate responsibility for shaping the world ourselves.

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AI technocrats

This abdication is not technological but political. It mirrors the broader surrender to technocracy, where decisions are justified not by democratic

deliberation or moral reasoning but by expertise, efficiency, and ‘what works.’ Superintelligence becomes the ultimate technocratic dream: a machine so potent and efficient that human judgement is rendered obsolete. Yet the truth is the opposite: the more impressive the machines, the more urgent the need for human judgement, responsibility, and meaning.

What this does reveal, however, is that the real danger lies not in AI’s ‘intelligence’ but in our willingness to ascribe intelligence to it, thereby surrendering judgement to the illusion of its epistemic authority. This surrender is what re-legitimizes technocracy: if knowledge is an echo, then authority belongs to those who control the echo chambers.

By piercing the technological determinism at the heart of the AI narrative, we can now see that AI is not creating a new epistemic order but rather reinforcing the existing one by re-legitimizing technocratic expertise. In an era where shared systems of meaning have eroded, AI emerges as a neutral arbiter: it delivers outcomes without politics, information without debate, and efficiency without friction.

This is why governments, corporations, and institutions are rushing to adopt AI. It promises to resolve the epistemic crisis not by restoring meaning but by bypassing it. If people cannot agree on the truth, then at least they can decide on the value of predictive analytics. If language is contested, then let the machine generate the next word. If trust is in short supply, then let algorithms deliver measurable outputs. AI becomes the new priesthood of technocracy, offering legitimacy not through wisdom or meaning but through process-free outcomes.

But this re-legitimation comes at a cost. It entrenches the very crisis it claims to solve. By amplifying echoes, AI deepens the confusion between information and knowledge. By privileging outcomes over processes, it hollows out meaning. By perpetuating the fantasy of superintelligence, it seduces us into surrendering judgement. Far from overcoming the epistemic and existential crises of our time, AI intensifies them, binding us more tightly to a new technocratic order.

If AI represents the re-legitimation of technocracy, the task is not to resist the technology itself but to reassert the human dimensions it eclipses, and which created it in the first place. This means restoring the distinction between information and knowledge, emphasising the value of processes, and reaffirming that meaning cannot be outsourced to machines. It means challenging the seduction of outcomes divorced from legitimacy and refusing the fatalism of superintelligence.

The crisis we face is not that machines will overtake us, but that we will mistake their echoes for our voices, their outputs for our truths,

their efficiencies for our meanings. AI can only rule us if we allow technocratic logic to rule us first. The real challenge, therefore, is political and cultural: to defend the irreducible human capacity for judgement, imagination, and meaning-making against the flattening logic of outcome-driven technocracy. Only then can AI be placed in its proper role, not as the new sovereign of thought, but as a tool subordinated to the infinite human capacity for problem solving.

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Afterword

Patrik Schumacher

There is a lot of ambivalence in architecture, as well as in society at large, about the effects of Artificial Intelligence. For me and my firm the advent of AI has been an unmitigated boon. We do not see or feel any loss of agency. Quite the opposite: we feel empowered. We do not feel threatened by the proliferation of epigones and competitors. Quite the opposite: we are confidently exploiting the new tools to pull ahead of our competition. I also do not fear that fees will be squeezed. Previous productivity boosts – like the introduction of CAD or later BIM – did not disrupt the historical trend increasing professional fees as a percentage of construction. These productivity gains went into service and product quality upgrades rather than the reduction of employment.

At Zaha Hadid Architects the adoption of AI image generation systems like DALL-E, Midjourney and Stable Diffusion a.o. was rapid and pervasive. The use of these tools – together with our own tool building efforts on top – has delivered an important capacity and productivity boost, especially for early ideation and visualisation. While most front-end designers are using various generic and bespoke tools, we have also a dedicated AI development team within our computational design group CODE.

We have developed plug-ins for both Maya and Rhino that allow our designers to instantly render models in AI. We are mostly building on top of Stable Diffusion and are training specific LoRA (Low-Rank Adaptation) models from our own image bank for every new project to better target and streamline the AI ideation. We have also started to use a mediating platform – xfigura.ai – that makes many underlying AI models available and allows the AI project workflow to be displayed on a canvas that can be shared within the team and that allows the workflow to be graphically displayed with nodes and links in analogy to grasshopper.

We are also using various AI video generation tools to upgrade our presentations with animations.

In the meantime, some start-up companies have emerged that offer AI tools specifically to architects: LookX.AI is a Chinese generative image AI platform created by XKool, who had been using AI tools for years to optimize massing models within planning envelopes. LookX supports the training of models by users as well as working in teams. Gendo AI is a UK based platform crafted specifically for highly plausible, photorealistic architectural visualisations, focussing on ease of use and quick uptake within bread and butter architectural and interior work. The industry is moving fast, so this short snapshot provided in this article will be obsolete very soon, if not already at the time of printing.

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Productivity and creativity

In any event, I can say with conviction that all these new AI image tools already deliver not only significant productivity gains but indeed a notable creativity boost. Ever since DALL-E 2 prompting results were credible and coherent with respect to perspective, light & shadow, poise, etc. while at the same time delivering rather novel compositions. The ability to prompt with references to various architects – mostly ourselves – mixed with other architects (like Frei Otto), other styles, non-architectural industrial products or structures, landscape features, etc. shows generative image AI to be an engine of invention via hybridization. The images are coherent and suggestive enough to allow for their re-creation via 3D modelling to bring them into the designer's proper medium. The speed, number and variety of options with which ideas can be explored implies a much enlarged search space to find spatio-morphological ideas that can then be worked up into sketch solutions, or first approaches towards a potential design solution.

The photorealism of the ideation images implies the ability to bring clients early on into the ideation process. This can be very efficient. The capacity to sift through higher numbers of options, especially a larger range of options, implies an expanded and more thorough search which in turn implies an increased level of design process rationality and decision making. A solution that is selected from 250 options or candidates, from within a larger range of possible solutions, should inspire more trust than a solution that was selected from 5 or 10 candidates. To me it is evident

that a design ideation process that is augmented by generative image AI is both more creative, allowing for more novelty, which in turn gives more chances to discover innovations (novelties that represent improvements).

While I am thus enthusiastic about this new wave of powerful AI tools, I do not think that these generative image tools advance the discipline to the same extent as the computational-algorithmic design tools that started to enter the avant-garde arenas of our discipline since the mid-1990s and that led to the formation of a whole new style: parametricism. This style was responding to the challenges posed to urban and architectural design by the socio-economic restructuring from Fordism to Post-fordism triggered by the micro-electronic revolution. The response involved the belated introduction of the very computational technologies within architecture that had already transformed the tasks and problem space of architecture. This combination of the historically new design tasks – new level of complexity and dynamism in urban life processes – with radically new design tools bringing on radically new concepts and forms, ushered in this new style which evolved and matured in symbiosis with the computational tools over the last 30 years.

The latest stage of this development within architecture is the subsidiary style of tectonism, to be understood as parametricism's most sophisticated incarnation. The recent proliferation of AI image tools does not imply yet another style, but it does indeed imply a huge potential for the accelerated adoption of parametricism, in particular by the youngest architects. While the built environment does not yet manifest this, it is evident in the world of architectural AI images that circulate on the internet and manifest the desire and aspirations of young architects and designers. If you google AI architecture, you can immediately confirm this. At least 80 percent of AI generated architectural output can be classified as parametricism. For me this is deeply satisfying, in contrast to the stale and retrograde output of the profession for actual construction. The simultaneous advent of the metaverse is starting to engage in a combusive synergy relation with AI. In my view, the inevitable prospect of the metaverse taking over large parts of the internet and substituting or augmenting large parts of the physically built environment implies an avalanche of design work that can only be coped with by the full utilisation of AI empowerment. Here too, with respect to metaverse design, we can already unmistakably see the coming hegemony or all-pervasiveness of parametricism.

Research and development

While the big AI models know all about Zaha Hadid Architects and parametricism and are virtuoso contributors to parametricism – after all, we and many other protagonists of parametricism have been feeding images into the internet for over 25 years – the same is not yet true for the more recent and more exacting style of tectonism. Here the relative rarity of pertinent example images feeding into the training of the big models means that convincing results cannot yet be generated. There is also the added difficulty posed by the much higher level of specific rationality conditions that tectonism represents. Tectonism relies on various computational engineering and optimisation tools, integrating structural engineering logics, environmental engineering and optimisation for computational fabrication, i.e. there are many ways in which the AI model can get this wrong. However, the case is far from hopeless. We have already been teaching our AI systems the various engineering logics and rules of tectonism with convincing success by using our extensive image bank, plus simulated synthetic data, for training purposes.

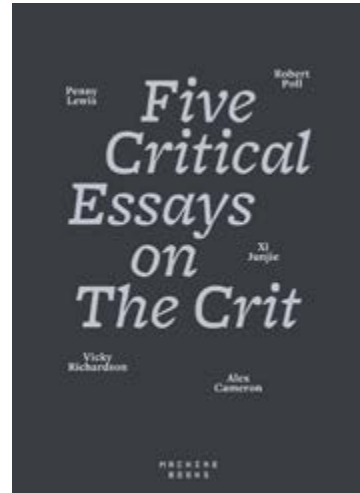
There is, however, another potent, and indeed more important contribution AI can make to the further advancement of tectonism (and thereby of architecture): The Large Language Models (LLM) like ChatGPT are helping us architects (who are not professional software developers) to programme many more of the computational design tools we would like to have to advance the rationality, functional sophistication and intricacy of our designs. At Zaha Hadid Architects about 50 of our 500 members of staff are engaged in research, and for us research usually materialises in computational design tools that upgrade our design intelligence and workflows. In the medium and longer term, this aspect of the power of AI is probably significantly more impactful than the image generation tools. The image models themselves too can be engaged in this more functionally driven tooling. These models can be trained with simulation results, for instance of structural topology optimisation or of heatmap outputs of agent-based occupancy simulations, and then deliver approximate, usable results in a fraction of the time required by the original simulations, thereby delivering very useful shortcuts for the designer churning options with nearly real-time analytical feedback.

To conclude: I am not only optimistic, I am thrilled about AI empowering architecture and literally all other arenas of work, including science as well as creative work. However, it remains the task of self-reflective, mission-driven humans – interacting with each other in critical discourses

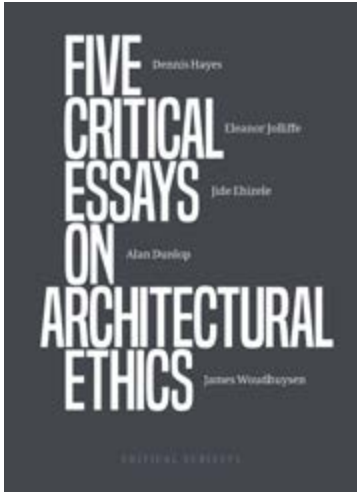
– to devise, train, steer, put to work, and utilize AI systems to the empowerment and flourishing of the human project.

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Five Critical Essays on AI

Published by
TRG Publishing

Sponsored by
Zaha Hadid Architects

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£4.00



ISBN: 978-1-903094-09-9