

What was the Turing test actually about?

Mathematician Alan Turing proposed that machines would one day be able to think and behave like humans (see *Nature* **619**, 686–689; 2023). This vision was challenged by neurosurgeon Geoffrey Jefferson, who argued, for example, that machines could not be classed as able to think until they had mastered language and written a sonnet.

To respond to such objections, in 1950 Turing developed a test to explore a machine's ability to show seemingly intelligent behaviour, while hinting at his mathematical concept of imitation based on universal computing. His scientific question was whether an individual of one kind could imitate stereotypes of an individual of another kind.

Viewing Turing's test from the perspective of benchmarks or its public misuse misses the point of his argument (B. Gonçalves *The Turing Test Argument*; Routledge, 2023). Just as ideas about the meaning of the Universe were once detached from Earth, Turing sought to expand the meaning of 'thinking' and detach it from the anthropocentrism that contributes to the human view of both society and nature.

It is important to develop metrics for the public scrutiny of today's generative artificial intelligence (*Nature* **619**, 671–672; 2023), but also to have historical perspective. We now live in one of many possible Turing futures, in which machines can pass for what they are not. Turing had good reasons to hope for some of those futures, but urged humanity to avoid others.

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Devise an ethical open-access publishing model

Scholarly publishing revenue has conventionally come from library subscriptions paid for mainly by publicly funded institutions, and so is underwritten by the taxpayer. In my view, such institutions should also pay for their open-access publications. Recognizing who ultimately pays for scholarly publishing therefore raises ethical concerns (see *Nature* **623**, 472–473; 2023).

The open-access business model requires authors to pay article-processing charges (APCs). This stimulates a keen interest in the variation in APCs, especially for authors expected to dip into their research grants. These frustrated colleagues frequently write to me, as editor-in-chief of a leading open-access journal, demanding that the publisher waive the APCs. I doubt they have ever demanded that publishers of subscription journals provide a free subscription.

But taxpayers underwrite scholarly publishing for publicly funded institutions, irrespective of the business model, and so the institutions – rather than individual researchers – should pay the APCs. And those institutions need to collaborate with publishers to produce a financially viable, ethical open-access scholarly publishing model. Lobbying your vice-chancellor or president, rather than complaining to journal editors, should facilitate the process.

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Should scientists delegate their writing to ChatGPT?

Scientists should exercise caution when using generative artificial intelligence (AI) tools such as ChatGPT to write grant applications (see J. M. Parrilla *Nature* **623**, 443; 2023). Writing and thinking are not separate activities. AI-generated text might not be meaningful because it is not founded on a deep knowledge of the context of the scientific problem, the research gap, the broader societal impact, the ethical responsibilities involved and the researcher's values.

ChatGPT can generate seemingly polished text to explain a grant's purpose or rationale, projected outcomes or social impact, or specific processes such as the handling of sensitive data or the treatment of human participants in research studies. But to be impressed by that polish is to confuse style with substance.

Researchers can delegate their writing to ChatGPT to the extent that they take intellectual ownership and ethical responsibility for its words. However, they must think critically about when, how and why to use generative AI in light of the communicative context, audience needs, medium and purpose of writing. A critically literate approach to AI invites scientists to use generative AI to assist scientific communication, not substitute for it.

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Mentor–trainee dialogue on proper use of AI tools

The responsible use of artificial-intelligence (AI) tools in education and academia is important on a micro- as well as a macro scale (see *Nature* **623**, 457–458; 2023) – particularly in exchanges between mentors and their trainees.

Trainees and students can use large language models such as ChatGPT across their assignments and academic tasks, so they must learn to use AI judiciously. Competent mentors who have a robust and open relationship with their charges can make a significant contribution by coaching them in the effective and ethical implementation of AI (see *The Science of Effective Mentorship in STEM*; US National Academies Press, 2019).

The mentor can use such dialogue to discuss what constitutes trusted knowledge, to closely assess a trainee's innate abilities and comprehension and to help them determine whether their AI-enhanced output aligns with acceptable scholarly practices or amounts to plagiarism, for example. This approach stands to improve trainees' skills, academic diligence and productivity, as well as to prevent the misuse of AI tools.

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