

AI Claims Brute-Force Resolution of Over a Hundred Century-Old Math Problems: Are Mathematicians Truly Experiencing a "Collective Breakdown"?

Original by **Shubingbing** • *Sanlian Lifeweek Journal* • Oct 11, 2026 • Reporter: **Wu Shuwen**

On October 6, OpenAI publicly released 722 mathematical manuscripts generated by its internal frontier models, categorized into 372 result families. Hundreds of open problems were thrust before mathematicians almost simultaneously, swiftly igniting debate: Whether these proofs hold up requires verification; but far harder to answer is what happens to mathematics when AI produces results vastly faster than humans can read, understand, and absorb them.

A month earlier, a similar issue was brought into the open. On September 11, twenty-five Fields Medalists jointly published a statement titled "The Severe Misalignment of Artificial Intelligence in Mathematics," criticizing AI companies for using famous math problems as display pieces for model capabilities. The direct catalyst was OpenAI's prior claimed breakthrough on the Navier–Stokes problem, which triggered intense debate over research priority, attribution, and scientific norms.

Since then, AI math capabilities have continued to advance rapidly, making the questions facing the mathematical community ever more concrete: Once an answer is obtained, who will understand it? How do we turn a proof into knowledge that the entire community can inherit? How should young mathematicians train their intuition and judgment?

Addressing these questions, Sanlian Lifeweek interviewed two signatories of the joint statement: 2022 Fields Medalist James Maynard (University of Oxford) and 1998 Fields Medalist Curtis McMullen (Harvard University). In their view, what mathematics truly pursues has never been just the answers themselves.

1. An Urgent Joint Statement

Sanlian Lifeweek: This joint statement was organized in a very short timeframe. Why did mathematicians feel compelled to speak out publicly at this precise moment?

Maynard: For me, the key trigger that motivated me to coordinate this effort was the controversy surrounding OpenAI's announcement claiming to solve the Navier–Stokes Millennium Prize Problem—specifically the statement by Tristan Buckmaster, which raised deep concerns about how this result was derived.

In my view, the issue lies in how AI companies use mathematics to showcase their own capabilities. Many recent high-profile results could have served as wonderful, positive examples of human-AI collaboration, accelerating scientific

progress at speeds unimaginable a year ago. Unfortunately, the manner in which several of these results were produced had the opposite effect, ultimately harming the underlying scientific research.

McMullen: What first caught my attention was that frontier AI laboratories did not seem to fully consider the direct impact of their actions on the mathematical community. Mathematics is a highly vibrant ecosystem comprising undergraduates, PhD students, advisors, researchers, and professionals in industry; people lecture, write papers, and stand atop thousands of years of accumulated mathematical culture. Yet AI companies have shown little proactive interest in engaging with this community—they didn't even reach out to the American Mathematical Society.

What concerned me even more was how OpenAI handled the Navier–Stokes problem and announced its results. By the standards of mathematicians, academia, and the broader scientific community, this approach fell short of scientific research norms and ran counter to the established customs of mutual respect within the mathematical community.

There is a standard convention in mathematics: if a small team of researchers is investing immense effort into a problem and making steady progress, others generally do not jump in abruptly to scoop them. Tristan Buckmaster and Dallas Albritton had already made substantial progress on this problem; as I understand it, OpenAI attempted to jump ahead and claim the solution right under those circumstances.

It is akin to scaling a formidable mountain. Early researchers (like Córdoba and Martínez-Zorro) mapped out a viable route up the mountain and spent years advancing halfway up. Subsequently, Albritton and Buckmaster thought that with the aid of AI tools, they could push further along this route and perhaps reach the summit. As they drew closer to the top, OpenAI appeared to observe their proximity and acted to reach the peak first.

The mode of publication was also problematic. OpenAI did not follow standard mathematical practice by submitting the work to a peer-reviewed academic journal; nor were they transparent regarding how the result was actually obtained—we still do not know the full details today. Crucially, they failed to adequately acknowledge the contributions of the researchers who paved the way and laid the groundwork for this result.

What truly worries me extends beyond this single mathematical dispute. If frontier AI labs can dismiss the impact of their actions on the academic community so casually, they may similarly overlook broader societal impacts and ethical norms. This concern goes far beyond mathematics. I view what occurred in the math community as a warning sign of what may come in other domains.

Sanlian Lifeweek: What concrete changes does the joint statement hope to foster? In your ideal framework, how should AI companies participate in mathematical research going forward?

Maynard: I genuinely hope AI enterprises conduct math-related research in an open, collaborative scientific spirit without rushing to grab headlines.

They can collaborate with experts and publish results in appropriate formats that facilitate academic understanding and evaluation; disclose the research process more transparently, including failed attempts; pay attention to what problems mathematicians are actively working on and avoid jumping in ahead of researchers who are close to a breakthrough—especially early-career scholars—directing AI capabilities toward other open problems instead; fully credit foundational prior ideas; take responsibility for published results by organizing and publishing them according to academic standards; and work to preserve the open, mutually supportive culture of mathematics.

Many of these recommendations require only minor adjustments from companies, yet would make them far more welcome within the mathematical community.

2. When Answers Are No Longer Scarce, What Does Mathematics Pursue?

Sanlian Lifeweek: Many people view mathematics as the continuous search for answers. For mathematicians, is obtaining the answer itself the primary goal of mathematics?

Maynard: In my view, the true value of a mathematical result lies in whether it enhances human understanding of mathematics. If an AI-generated proof helps mathematicians better understand mathematical objects, then it is valuable; if humans cannot extract understanding from that proof, it holds little intrinsic value.

For example, I have no doubt that the Riemann Hypothesis is true, but I am deeply eager to know *why* it is true and how it fits into a larger mathematical picture. If AI can help us comprehend the underlying "why," that would be wonderful; if it merely asserts that the Riemann Hypothesis holds and nothing more, it does not advance my scientific understanding.

Somewhat counterintuitively, short-term progress in problem-solving can sometimes hinder long-term development. The renowned mathematician William Thurston wrote a brilliant essay, *"On Proof and Progress in Mathematics,"* reflecting on how producing too many results too quickly unintentionally harmed his subfield—others stopped working on those problems, making the field harder to sustain over time. This rarely happens when human mathematicians achieve results, because humans deliver lectures, convey intuitive ideas, foster understanding, and lift the entire field. But I worry AI proofs may make this "short-term gain blocking long-term goals" phenomenon far more prevalent, as digesting the underlying ideas and intuition from AI proofs requires immense time and energy.

Sanlian Lifeweek: You repeatedly emphasize "human understanding of mathematics." How is this understanding formed? What role do creativity and intuition play, and could AI possess these capabilities in the future?

McMullen: People often perceive mathematics as a rigid, formulaic discipline, but that perception is inaccurate. Mathematics advances precisely through human creativity and original ideas; creativity, originality, and perseverance are qualities refined by top researchers.

Creativity means devising an unexpected path toward a problem rather than merely grinding away to reach an answer. So when I say we aim to advance human understanding, I do not mean completing a tough intellectual task, but creating new concepts that did not exist before.

I place "imagination" alongside "intuition"—two elements people often overlook, yet are vital in mathematics. The capacity to think in and navigate abstract concepts is something mathematicians treasure deeply.

One of the captivating aspects of mathematics is how it challenges your imagination. Math is abstract; approaching it relies heavily on imagination to cultivate the ability to manipulate abstract constructs.

We also speak of "mathematical intuition"—which is not about instantly solving a problem, but developing a feel for what the answer might look like before actually arriving at it. It stems from accumulated experience, much like a skilled detective piecing together clues: a bit of evidence here, a clue there, combined with extensive experience to synthesize the full picture.

Currently, I don't think AI possesses this intuition; for now, it remains uniquely human—though that could evolve. Humans live in a three-dimensional world and intuitively grasp 2D and 3D objects, visualizing a cube without needing equations. At present, AI appears to lack this inherent geometric intuition shared by humans.

Maynard: My perspective has evolved. I now believe AI will likely play a prominent role in high-level, creative aspects of mathematics. While I don't believe AI has produced entirely novel conceptual breakthroughs yet, its capabilities are growing rapidly, and doing so in the not-too-distant future is entirely plausible.

Sanlian Lifeweek: Mathematical research is clearly not a solitary endeavor. How does a new result transition from an individual discovery into knowledge the entire community can understand, inherit, and build upon?

McMullen: When someone solves an important problem, they give talks at other research centers, explaining how they achieved the result and what new methods emerged. Those ideas then spread across the community, allowing others to develop them further.

This internal community interaction and communication is an indispensable part of the mathematical process. Currently, when AI proves something, it isn't particularly good at explaining what it actually did. Thus, even if AI obtains a mathematically significant result, humans still need to form their own understanding and express it in ways that benefit the broader community.

3. After AI Becomes an Everyday Tool, What Remains for Mathematicians?

Sanlian Lifeweek: How do you personally use AI today? How has it altered your research workflows?

Maynard: I frequently use AI tools to accelerate the more routine aspects of my work, such as checking derivations, writing code, and performing computations.

I also regularly test what AI can accomplish within my own research domain; however, for the core, challenging problems I genuinely enjoy wrestling with, it hasn't provided extraordinary help yet—though I expect that to change over time.

Personally, I only form true intuition for a problem after grappling with many smaller instances myself. I am reluctant to outsource that phase to AI, as I fear it might weaken my ability to cultivate deep mathematical intuition.

McMullen: I use AI continuously. Recently, while writing a long paper over three months, I used it extensively almost every day.

I do use it to solve mathematical subproblems, and I also treat it as a sounding board—when an idea occurs to me, I like hearing how another voice responds. AI excels at this: as you develop your thoughts, you can engage in continuous dialogue with it. That is one of its finest applications.

Furthermore, AI performs computations and checks examples far faster than previous methods. I have used computers and programmed extensively throughout my career, but programs that used to take a week to write can now be completed very quickly—a tangible advantage.

Sanlian Lifeweek: For the younger generation of mathematicians, which tasks can be safely delegated to AI, and which capabilities must be honed through personal rigor?

Maynard: That is a question I spend a lot of time pondering. Everything is changing so rapidly and filled with uncertainty that giving a definitive answer is tough. As far as I know, truly mastering mathematical research still requires spending solo time wrestling with problems to build intuition. That remains crucial, and whether AI helps or hinders that learning process is unclear—I lean toward keeping AI out of that foundational phase.

On the other hand, AI will obviously play an increasingly vital role, and the next generation will likely excel at leveraging these powerful tools. A hybrid approach may be best, though much depends on individual preference.

McMullen: What students truly need to retain is ownership over the overall research process. They must guide the project, judge which problems are genuinely interesting, and remain versed in existing literature.

Literature retrieval is a major benefit of AI. AI acts like a friend who has read every book in the library and remembers them vividly. Materials that were once hard to track down can now be unearthed easily. Delegating routine tasks to AI frees up time to invest in the truly creative aspects of mathematics.

Sanlian Lifeweek: If AI continues to evolve at this pace, how will the identity of "being a mathematician" change? What kind of mathematicians will be needed in the future?

Maynard: Human mathematicians retain a distinct role: systematically deepening human understanding of mathematics. If no human cares about the Riemann Hypothesis, what is the purpose of solving it? Deciding which problems are interesting, understanding the results, and digesting and communicating them—even in a world with superintelligent AI, these tasks must still be performed by humans.

McMullen: AI is profoundly changing how research is conducted and impacting education, particularly doctoral training. Spending five years mastering specialized knowledge, reading difficult papers, and ultimately making an original contribution at the frontier of mathematics is a core reward of earning a PhD—and the standard for determining whether one can conduct independent research.

The mathematical community now worries that this standard is being disrupted: a problem a student spends years on might be solved by AI in weeks. If a student works independently for five years developing new concepts, and AI solves the same problem in parallel, does that diminish the value of the student's work?

This gets to the heart of the matter: the intrinsic value of human mathematical experience, the imaginative challenge of research, and the personal perspective cultivated through years of study.

As AI becomes a standard research tool, we must adapt our evaluation criteria: how we assess paper significance, what we expect in academic talks, and how we view the pace of mathematical progress.

Equally concerning is the talent pipeline into mathematics: a student falls in love with math in high school, majors in it at university, excels, and pursues a PhD. This pipeline continually refreshes our community. Today, some young people hesitate: should they commit five years to a math PhD? Not necessarily because they think AI will replace mathematicians, but because of the immense uncertainty. In such an uncertain environment, making long-term commitments becomes difficult.

Yet from my perspective as a mathematician, participating in this transformation is deeply exciting. AI can bring about many good things. In fact, one could argue society needs more mathematicians.

Along these lines, I would add one final point: it is vital for mathematicians to popularize mathematics—explaining to non-specialists and the public what is happening in the mathematical world, why it matters, and why it is fascinating. As AI handles more routine reasoning, the mathematician's role as a communicator and educator of mathematics will become even more essential.