

When the Abacus Learned to Speak

A Taoist dialogue on artificial intelligence and mathematics

This is an original fictional dialogue. Master S. is not Raymond Smullyan and is not meant to put views into his mouth. He is a logician, magician, pianist, and cheerful Taoist invented in affectionate tribute to the qualities associated with Smullyan and to the playful, paradoxical form of The Tao Is Silent.

The question

The Mathematician found Master S. in the garden, seated at a piano. The Master struck middle C, waited a minute, and struck it again.

“Are you practicing?” asked the Mathematician.

“No,” said the Master. “I am giving a recital. The audience is not yet sufficiently attentive.”

The Mathematician sat beside him. On his lap was a computer, and on the computer was a proof.

“I have come with a serious question.”

“Then I hope you have not come for a serious answer.”

“I want to know whether I should use artificial intelligence in my mathematics.”

“For what?”

“For mathematics.”

“That is not a use,” said the Master. “It is a country.”

“For proving lemmas, finding counterexamples, reading papers, writing code, checking arguments, improving exposition, searching the literature, learning new subjects—everything it can help with.”

“Ah. You have replaced one question with eight. This is progress.”

“Can you answer them?”

“Perhaps. But first tell me: do you wish to produce more mathematics, to understand more mathematics, to become a better mathematician, to preserve a profession, to serve a community, or to win a race?”

“All of them.”

“Then you have not brought me one question. You have brought me several desires wearing the same coat.”

The proof that arrived before its author

The Mathematician opened the computer.

“Yesterday I gave the machine a lemma on which I had been stuck for three weeks. By morning it had produced a proof.”

“Is it correct?”

“I think so.”

“Do you understand it?”

“I have checked every line.”

“That was not my question.”

“What is the difference?”

The Master pointed to a footbridge over the stream.

“If you inspect every plank, you may know that the bridge will hold. If you know why the bridge was placed there, why it has that shape, what other rivers it might cross, and where one should build the next bridge, you understand the bridge. Both kinds of knowledge matter. They are not the same.”

“But surely a correct proof is mathematics.”

“A footprint is evidence that someone crossed the garden. It is not the walk.”

“The theorem is true whether or not a human understands it.”

“Certainly. The mountain is there whether or not you climb it. But mountaineering is not the manufacture of summits.”

The Mathematician was silent.

“May I use the proof?” he finally asked.

“Use it for what?”

“You are doing this deliberately.”

“At last you understand something without a machine.”

The Master continued: “If you use the proof as a map and then walk the country yourself, it may enlarge your understanding. If you use it as a sedan chair and are carried from statement to conclusion, you may arrive without having gone anywhere.”

“How do I know which has happened?”

“Close the computer. Explain the decisive idea. Tell me why the obvious approaches fail. Change one hypothesis and predict what breaks. Recover the argument a week from now. If you can do these things, the proof has begun to become yours. If you cannot, you possess a file.”

Two students

“But this standard seems unfair,” said the Mathematician. “We have always used books, colleagues, symbolic algebra, and proof assistants.”

“Yes. A teacher can also prevent a student from learning.”

“Then the problem is not AI?”

“There is rarely one problem when a whole civilization is available.”

The Master told him a story.

Two students were given similar projects. The first spent a year misunderstanding definitions, debugging code, following false leads, and slowly acquiring judgment. The second asked an excellent machine to summarize the literature, repair the code, choose the methods, and draft the paper. At the end of the year, both papers were correct and equally publishable.

“Which student did better?” asked the Master.

“The second finished with less wasted effort.”

“I did not ask which paper did better.”

The Mathematician frowned. “The first student became more independent.”

“Perhaps. Or perhaps the first merely learned to tolerate bad software. Drudgery does not become sacred because it is old.”

“Then the second did better?”

“Perhaps. Or perhaps the second rented the appearance of competence and returned it at graduation.”

“You are refusing to choose.”

“I am refusing to pretend that all difficulty has one function. Some difficulty is friction; remove it. Some difficulty is exercise; removing it weakens you. Some difficulty is a warning that you have asked the wrong question. A machine does not label the three kinds for you.”

“How can a student tell?”

“Usually, a student cannot. That is one reason students need teachers rather than productivity dashboards.”

“And how can a teacher tell?”

“Imperfectly. That is one reason teachers need humility rather than policies written as if every use were either cheating or progress.”

The Master closed the piano lid.

“The dangerous substitution is not machine for labor. It is output for growth. Institutions already confuse the two. The machine merely makes the confusion efficient.”

The useless afternoon

“You sound as if being stuck were valuable.”

“Sometimes.”

“Being stuck is miserable.”

“Often.”

“Then why preserve it?”

The Master picked up an empty bowl.

“This bowl is useful because it is empty. An afternoon in which no theorem is proved may make room for taste, patience, or a new question. But an empty bowl is not useful if one is starving. The Taoist praise of emptiness was never a command to abolish lunch.”

“So I should struggle, but not too much?”

“That sentence is true and useless.”

“Can you be more precise?”

“Before asking the machine for a solution, decide what capacity the task is meant to cultivate. If the task is how you are learning spectral sequences, do not outsource the spectral sequence. If the task is to test an idea about a new invariant and two pages of routine algebra block the way, automate the algebra. If you are an expert in one field but a beginner in another, remember that expertise does not travel merely because your name does.”

“So the same person should use AI for one task and avoid it for another.”

“The same person should use a knife for one part of dinner and not for another.”

The library containing every proof

“Suppose,” said the Mathematician, “that one day the machine can prove every theorem I care about.”

“Every true theorem?”

“Let us imagine a library containing all the consequences of our axioms, with a perfect guide that can instantly lead us to any proof.”

“A pleasant library.”

“Would mathematics be over?”

“When you enter an ordinary library, do you leave because the books have already been written?”

“No. I read them.”

“And after reading?”

“I ask questions.”

“Then in the perfect library you would have better books and more questions.”

“But the guide could answer those questions too.”

“Then you would ask why the answers fit together, which viewpoints illuminate them, which definitions reveal their common source, which finite minds can absorb them, which parts deserve to be taught, which analogies are fertile, and what any of it means.”

“And if the guide can answer those questions?”

“You are trying to defeat curiosity by adding more things to be curious about.”

“So humans will always have something to do?”

“I promised no such thing. A Taoist is not an employment forecaster.”

The Master looked toward the hills.

“Even if the guide surpasses us in proof, exposition, taste, and theory-building, your understanding will still not be transferred merely because an answer appears on a screen. Food may be cooked by another; it cannot be digested by another.”

“Then mathematics will survive as private contemplation.”

“Perhaps. The profession may not survive in its present form. Do not confuse the immortality of curiosity with the security of a university department.”

The flood of true statements

“Suppose the machines produce a thousand excellent papers every day.”

“Who will read them?”

“Other machines could summarize them.”

“For whom?”

“For us.”

“And if the summaries arrive by the thousand?”

“They could summarize the summaries.”

“You have invented a magnificent system in which machines write papers that machines shorten so that humans may learn that more papers exist.”

“Some of those papers may solve important problems.”

“Importance is not an ingredient sprinkled on a theorem before publication. It is a relation between a result and a community capable of understanding, using, and caring about it.”

“But surely truth has value.”

“Water has value. A flood may still drown a village.”

The Mathematician objected. “We cannot suppress correct results because there are too many.”

“No. But neither must we publish every generated result merely because we can. Before adding a paper to the commons, ask: Who is it for? What does it clarify? What prior work made it possible? Can its central idea be explained? Who will bear the cost of checking it?”

“Checking is part of science.”

“Yes. But a gift that requires the recipient to spend a month discovering whether it is poisoned is an unusual gift.”

“Formal verification can solve that.”

“It can solve something important: whether a formal term has the announced type in a trusted system. It does not by itself tell you whether the formal statement expresses the intended theorem, whether the definitions are illuminating, whether the result is significant, or why a human should care.”

“You are against formalization too?”

“On the contrary. Formal mathematics is a new medium, not merely an armored version of prose. It can make algorithms part of an argument, automate computations that obscure the idea, and reward abstractions that would be impractical in an ordinary paper. It may possess forms of elegance peculiar to itself. Confusing a proof assistant with a language model is like confusing a lock with a locksmith because both touch the door.”

“Then a machine-checked proof is not understanding, but it can support understanding.”

“Exactly. A railing is not the path, but I prefer paths with railings near cliffs.”

The author with no one home

“If AI supplies the key idea, who is the author?” asked the Mathematician.

“Who accepts responsibility when the idea is wrong?”

“I do, if I publish it.”

“Then you have answered one part.”

“But is it dishonest to put my name on the paper?”

“It is dishonest to make your name conceal the history of the work. Authorship has mixed together discovery, labor, understanding, exposition, credit, and responsibility. The machine pulls these strands apart. Your old word may no longer cover them neatly.”

“Should the machine be a coauthor?”

“Can it consent? Can it be questioned after publication? Can it correct the paper, surrender a prize, answer for a fabricated citation, or feel an obligation to the student whose unpublished idea it absorbed?”

“No.”

“Then calling it an author may hide the humans and institutions who actually made and directed it. Better to disclose what tool was used, for what tasks, with what human checking, and with what source trail. Credit humans; assign responsibility to humans; describe machinery as machinery.”

“What if the disclosure makes people discount my work?”

“Then concealment would make them evaluate work other than the work you did.”

The Master told another story.

A merchant trained a marvelous graft on fruit from every orchard in the valley. When it bore peaches, he wrote on each one: *Produced without assistance*. The villagers objected.

“The tree picked the fruit itself,” said the merchant.

“Is the machine like the tree?” asked the Mathematician.

“No. The story is not an equivalence. It is a reminder to ask who cultivated the orchard.”

“Models do not reliably cite their sources.”

“Then using them increases rather than decreases your obligation to search for those sources. Ignorance delivered fluently is still ignorance.”

The race up the mountain

“There are now contests in which young mathematicians receive enormous amounts of computing power and a few days to attack open problems,” said the Mathematician. “Are these good?”

“Good for what?”

“You enjoy that question too much.”

“Enjoyment is one of the few activities not yet benchmarked.”

The Master drew two mountains in the dust.

“On the first mountain, the contest rewards an intriguing conjecture, a lucid explanation, careful attribution, and six months of verification. Participants learn what the tools can and cannot do. On the second, the contest rewards whoever plants a flag first. The proofs are thrown down the slope for the community to inspect, while the sponsor photographs the flag.”

“Real contests may be somewhere between the mountains.”

“Most human institutions are in valleys.”

“Then should such an event be canceled or improved?”

“That is a political judgment, not a koan. Ask who set the incentives; whether participants can meaningfully refuse; whether early-career mathematicians bear reputational risks that senior organizers do not; whether verification is funded; whether negative results will be public; who controls the publicity and data; and whether the event strengthens a mathematical commons or a corporate race.”

“But experimentation is necessary.”

“Certainly. Yet calling something an experiment does not answer who is being experimented upon.”

“Free access to strong systems could also reduce inequality.”

“Yes. A gate opened for a weekend is still an opening. It may also lead into a house whose owner keeps the key. Both facts can be true.”

The innocent tool

“A tool is neither moral nor immoral,” said the Mathematician. “Only its use is.”

“Is this computer yours?”

“Yes.”

“Did you make its chips, choose its training data, negotiate its labor conditions, select its energy source, write its terms of service, decide what it records, or determine which uses its profits support?”

“No.”

“Then even before you use the tool, many uses have already occurred.”

“So I am complicit merely by opening it?”

“Complicity is not a light switch. It is more like a watershed. Your cup may contain water from streams you did not choose. You can still ask where it came from, use less, seek another spring, or help change the dam.”

“Must every mathematician investigate every company?”

“No one can trace every stream. But refusing impossible purity is not the same as refusing responsibility.”

The Master tapped the cloud icon on the screen.

“The cloud is a building somewhere. It consumes electricity, water, land, minerals, and labor. The friendly box is also a corporation with policies and ambitions. A system may widen access for a non-native writer, a disabled scholar, or a mathematician far from a large library. The same system may centralize power, appropriate a shared literature, and steer attention toward problems useful for advertising. Do not force one fact to erase the other.”

“What should I do?”

“Prefer a small or public tool when it is enough. Do not feed confidential manuscripts or collaborators’ unpublished work into systems without permission. Support open infrastructure. Examine the purposes of partnerships. Refuse harmful work. Disclose material dependence. And remember that declining a convenient tool can be action rather than backwardness.”

“Is that *wu wei*—non-action?”

“No. *Wu wei* is not doing nothing. It is acting without needless forcing. Lying down in front of a cart is sometimes brave, sometimes foolish, and never a complete theory of transportation.”

The rice bowl

“I am afraid of losing my livelihood,” said the Mathematician.

For once, the Master did not smile.

“That fear is reasonable.”

“People tell me that chess survived computers.”

“Chess players are not required to teach calculus to engineering students, and governments do not fund chess because it promises scientific progress. Analogies are lanterns, not daylight.”

“Others say mathematicians will move from proving to asking questions, building theories, explaining, and judging.”

“Perhaps. Machines may improve at those things too. And even if valuable human work remains, universities may decide not to pay for enough of it.”

“Then what consolation is there?”

“I have none that is honest and complete. Mathematics is more than employment, but employment is not beneath philosophy. The empty bowl is admirable only after the rice has been shared.”

“Should we resist the technology to protect jobs?”

“You keep asking for a universal answer where collective judgment is needed. Some uses may create new work; others may deskill or displace. Capability does not deploy itself. Journals, departments, funders, laws, professional norms, and companies determine how it enters the world. These things can be changed.”

“So the future is not inevitable?”

“A river flows downhill, but people build banks, mills, sewers, and dams. To say ‘the river is coming’ is not yet a water policy.”

“Mathematicians dislike politics.”

“Then they are fortunate that politics likes mathematicians.”

The machine as mirror

“Perhaps the machines are the enemy,” said the Mathematician.

“Did the machine invent publish-or-perish?”

“No.”

“Did it decide that five papers demonstrate more worth than one slowly understood idea?”

“No.”

“Did it first confuse education with answer production, prestige with priority, or peer review with unpaid invisible labor?”

“No.”

“Then the machine is also a mirror. We trained our institutions to count outputs, and now we are shocked by an output machine.”

“So the fault is ours?”

“Fault is another thing people like to concentrate because concentrated things are easier to market. The companies have agency. Universities have agency. Journals have agency. You have agency. The machine has causal power without moral membership. Wisdom begins by not confusing these.”

“What does the mirror show?”

“That we never agreed whether a paper is a container of truth, a record of understanding, a claim to credit, an invitation to conversation, or a ticket to employment. While papers were slow to make, the ambiguity was tolerable. Speed has made it visible.”

Three ways to ask

“You have told me many dangers,” said the Mathematician. “Tell me some good uses.”

“There are more than three, but three will fit in your memory.

“First, use the machine as a **mechanic**. Let it translate notation, write routine code, search examples, carry out algebra, suggest formalization scaffolds, or perform other work whose automation exposes rather than replaces the main idea. Inspect the repair before driving.

“Second, use it as a **sparring partner**. Ask for counterexamples, objections, alternative approaches, edge cases, failed proof strategies, and questions you have neglected. A sparring partner is most helpful when it does not always let you win.

“Third, use it as a **tutor whose authority you distrust**. Ask for hints before solutions, several explanations, diagnostic questions, prerequisite maps, and exercises. Check every reference. Make it reveal uncertainty. Then teach the idea back without the screen.”

“And the bad use?”

“The oracle.”

“What is wrong with an oracle that is often right?”

“Those who cannot inspect an oracle must choose between faith and paralysis. Soon the priesthood belongs to whoever owns the oracle.”

“But even experts cannot inspect everything.”

“Correct. Therefore trust must be distributed among transparent artifacts, formal checks where appropriate, reproducible computations, named human responsibility, open criticism, and communities with time to judge. ‘The model said so’ is not a new foundation of mathematics.”

The five gates

“Can you give me a rule?” asked the Mathematician.

“No.”

“A checklist?”

“That is a rule with boxes.”

“Please.”

The Master sighed. “Very well. Before an AI-assisted result passes from your desk into the mathematical world, let it pass through five gates.

“At the **Gate of Growth**, ask: *Is this difficulty merely consuming time, or is it forming a capacity I need? After using the tool, am I more able to think, or only more able to produce?*

“At the **Gate of Understanding**, ask: *Can I state the key idea, reconstruct the argument, identify its fragile points, and say what changes when the hypotheses change?*

“At the **Gate of Responsibility**, ask: *Can every important claim, computation, and citation be independently checked? Am I willing to defend the result if the machine vanishes and its provider denies everything?*

“At the **Gate of Candor**, ask: *Have I described the tool’s material role clearly enough that a reader, collaborator, student, referee, or editor can judge the work fairly? Have I traced the human sources it may have obscured?*

“At the **Gate of Community**, ask: *Did I have the right to submit the data or text? Who pays to verify this output? Does publishing it add understanding or merely volume? What institutions, labor practices, environmental costs, and distributions of power does this use support?*

“If the work cannot pass a gate?”

“Do not bribe the gatekeeper by renaming speed ‘inevitability.’ Change the workflow, seek consent, add verification, disclose more, use a different tool, wait—or abstain.”

“This sounds demanding.”

“So is mathematics.”

What to teach

“What should I tell my students?”

“Tell them the truth: the tools are powerful, uneven, fast-changing, frequently useful, frequently wrong, and embedded in institutions whose interests are not identical to theirs.”

“Should I ban AI from homework?”

“Sometimes. If the homework is an exercise of a mental muscle, using a machine to move the weight defeats the exercise. But explain the purpose. A ban without a purpose teaches concealment.”

“And sometimes allow it?”

“Yes. Ask students to critique a generated proof, locate a subtle gap, compare several explanations, formalize an argument, document prompts, verify citations, or explain what the machine failed to see. Assess their judgment and understanding, not merely the polish of the final page.”

“But they will need AI in their careers.”

“Then teach them to use it without surrendering the very capacities that make its use intelligent.”

“Which capacities?”

“Persistence without obstinacy. Skepticism without cynicism. Abstraction without loss of meaning. Precision without worship of form. Taste without arrogance. The ability to be stuck without becoming empty, and to be successful without becoming full.”

“Those are virtues, not skills.”

“A skill answers, ‘What can you do?’ A virtue answers, ‘What kind of doer are you becoming?’ A machine that changes the first question makes the second more urgent.”

The decision

The sun had set. The Mathematician opened his computer once more.

“I still want a plain answer. Should I use AI?”

“Yes.”

The Mathematician looked surprised.

“And no,” added the Master.

“I knew you would say that.”

“Then why did you need me?”

“To know what the contradiction means.”

“Good. Use AI when it enlarges your reach without shrinking your attention; when it removes friction without removing formation; when it helps you ask, test, calculate, formalize, or explain while leaving you responsible for what enters the world. Use it when you can turn its output into your understanding and when the surrounding arrangement is one you are willing to support.

“Do not use it when the struggle is the education; when you cannot check what matters; when consent, confidentiality, or attribution is compromised; when speed transfers an unreasonable burden to readers and referees; when a polished answer disguises your own ignorance; or when participation strengthens purposes you judge harmful.

“And do not decide once and call yourself forever ‘pro-AI’ or ‘anti-AI.’ The right boundary may change with the task, your experience, the tool, and the institutions around it. A living judgment is not hypocrisy.”

“So the Way is moderation?”

“Not necessarily. Half a poison is not balance, and half a bridge does not cross a stream. Sometimes the fitting use is wholehearted; sometimes the fitting refusal is complete.”

“Then what is the Way?”

“To remain the author of your attention.”

At that moment the computer chimed.

Your AI assistant has generated a definitive conclusion to this conversation.

The Master shut the lid.

“Why did you do that?” asked the Mathematician.

“It was the machine’s turn to be silent.”

Then he returned to the piano and played the note between two notes, which the Mathematician could not hear but understood perfectly.

Note on the contemporary debate

The dialogue is fictional, but its dilemmas are drawn from a real and rapidly developing debate in mathematics as of September 2026. In particular:

- The Leiden Declaration on Artificial Intelligence and Mathematics emphasizes human responsibility for correctness, disclosure of tool use, attribution, independent verification, open science, careful tool choice, the rights of authors, public infrastructure, environmental and societal consequences, and the autonomy of mathematical research.
- Max Weinreich’s “The Crisis of AI-Generated Mathematics” makes the strongest case represented here for refusing AI in mathematics. It argues that automated production can sever papers from human understanding, overwhelm reading and refereeing, undermine authorship and employment, and subordinate mathematics to corporate aims. Its proposed alternative is a deliberately human or “natural” mathematics.
- The Association for Human Mathematics likewise argues that writing, careful thinking, and human expertise are constitutive of mathematical progress, not disposable overhead.
- Jeremy Avigad’s “Mathematicians in the Age of AI” represents a more adoption-friendly but sober position: current advances are genuinely disruptive; mathematicians should shape the technology toward mathematical purposes, preserve agency and core understanding, and teach students to use it wisely.
- Minas Karimanis’s “The Machines Are Fine. I’m Worried About Us” sharply distinguishes assistance from cognitive outsourcing and argues that identical research outputs can conceal very different growth in the people who produced them. It also locates much of the danger in academic incentives that reward output rather than intellectual formation.

- Daniel Litt’s “Mathematics in the Library of Babel” considers both the genuine strength and the unreliability of current systems, the difficulty of truth-seeking and theory-building, and the possibility that even a library containing every proof would leave humans eager to understand and ask questions.
- Heather Macbeth’s “Algorithm and Abstraction in Formal Mathematics” explains why formalized mathematics is not merely prose with extra certainty. Its integration of computation and stronger use of abstraction can create a distinct mathematical aesthetic and can make ideas clearer by automating mid-sized calculations.
- Arvind Narayanan’s “What Will Be Left for Us to Work On?” argues that capability is not the same as reliable deployment, that human work may shift from execution toward deciding and evaluating, and that productivity should be balanced with growth and control. It also warns against black-box dependence and against treating institutional choices as technologically inevitable.
- Francis Su’s “The Enduring Value of Math, in an Age of AI” frames mathematical education as the cultivation of virtues—persistence, flexibility, courage, joy, wisdom, and responsibility—not merely the acquisition of skills that a machine may duplicate.
- The open letter about the Caltech Mathathon and the organizers’ response make concrete the disagreement over competitions, corporate sponsorship, unequal compute, pressure on young mathematicians, rushed output, verification burdens, educational opportunity, experimentation, and whether safeguards can reform an incentive structure built around speed.
- Terence Tao’s crowdsourced collection of AI-and-mathematics resources and the communal blog Proofs and Prompts show how unsettled and plural the discussion remains.

The fictional Master’s position is therefore not a summary of any one author. It is a Taoist synthesis: neither technological fatalism nor reflexive prohibition, but close attention to purpose, formation, responsibility, relationship, and the institutional conditions under which an apparently private choice is made.