THE ON ___ ING SERIES

A LYRIC-PHILOSOPHICAL ESSAY

ON ASKING

on questions, intervals,
and the answer already folded in

$$\sqrt{1+2\sqrt{1+3\sqrt{1+4\sqrt{1+\cdots}}}} = 3$$

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for Srinivasa Ramanujan —

who asked, and waited,

and answered himself

To ask is to promise

that something will return.

I

In 1911 a clerk in Madras sent a puzzle to a small mathematical journal. He was twenty-three years old, mostly self-taught, and the puzzle was short enough to fit on a postcard: find the value of a square root that never ends — one folded inside another, inside another, each level opening onto the next like a door behind a door.[1]

The journal printed the question and waited. The story, as his biographers tell it, is that three issues went by — six months — and no one answered; so Ramanujan, at last, published the solution himself.[2] The answer, when it came, was almost an insult to the machinery of the question. The infinite staircase of roots, the endless regress of doors — all of it closes, quietly, on the smallest odd prime. The answer is three.

I have come to think this little episode is not an anecdote about mathematics. It is a portrait of asking itself. A question, honestly posed, is an act of faith performed in public: the asker declares that an answer exists, that the world owes the question a return, and then stands in the open to wait. And sometimes — this is the part the

1. S. Ramanujan, Question 289, *Journal of the Indian Mathematical Society* 3 (1911), p. 90; solution by the proposer, *ibid.* 4 (1912), p. 226. Both are reprinted in G. H. Hardy, P. V. Seshu Aiyar & B. M. Wilson, eds., *Collected Papers of Srinivasa Ramanujan* (Cambridge, 1927), p. 323.

2. The six-month telling is the standard biographical account (Robert Kanigel, *The Man Who Knew Infinity*, 1991). What the archive itself preserves is only the ending: the printed 1912 solution is signed *by the proposer*. Some would tell the waiting differently; the record holds nothing but the fact that the one who asked was the one who answered. See also B. C. Berndt, Y.-S. Choi & S.-Y. Kang, "The problems submitted by Ramanujan to the *Journal of the Indian Mathematical Society*," *Contemporary Mathematics* 236 (1999), 15–56.

portrait insists on — the waiting ends the way it ended in Madras. No one else arrives. The answer walks back through the door it left by. The one who asked was carrying it the whole time, folded somewhere he could not reach until the waiting had done its work.

To ask is to promise that something will return. This essay is about the shape of that promise — and about the strange bookkeeping by which the return, when it comes, weighs exactly what the asking weighed.

II

Here is the question that waited, and I will show it rather than hide it, because its face is gentler than its reputation:

$$3 = \sqrt{1 + 2\sqrt{1 + 3\sqrt{1 + 4\sqrt{1 + \cdots}}}}$$

Read it slowly, from the inside out — except that there is no inside. Every level says the same short sentence: *one, plus a number times the root of what comes next.* The multiplier climbs by a single step each time — two, then three, then four — a staircase with no landing. And yet the whole of it equals three. Not approximately three. Not three-and-a-remainder. Three, entire, the way a door is either open or it is not.

The secret is not a trick but a fidelity. Behind the radical stands a rule — one line of algebra — that holds at every depth without exception.[3] Because the rule is kept at level one, and level two, and level ten thousand, the endlessness stops being a threat and becomes a structure. The radical does not close despite going on forever. It closes *because* what it promises at each level, it keeps at the next.[4]

I know of no better emblem for a kept promise. A vow is not one large act but the same small act repeated at every depth of a life, each

3. The rule: define $F(x) = x + n + a$; then $F(x)^2 = ax + (n+a)^2 + x{\cdot}F(x+n)$, an identity that unfolds into the infinite radical when substituted into itself. Question 289 is the specialization $(x, n, a) = (2, 1, 0)$, whence $F(2) = 3$. See *Collected Papers*, p. 323, and B. C. Berndt, *Ramanujan's Notebooks, Part IV* (Springer, 1994), pp. 14–20.

level trusting the one beneath it. The astonishment of Question 289 is the astonishment of any faithfulness seen whole: that something without end can still be something definite. Three is what the staircase was building all along. It merely needed someone to ask.

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4. That an infinite radical of this kind genuinely converges — that "closes" is mathematics and not mood — is guaranteed by a criterion of Aaron Herschfeld, "On Infinite Radicals," *American Mathematical Monthly* 42, no. 7 (1935), 419–429 (doi:10.2307/2301294): a nested radical of nonnegative terms converges precisely when its terms grow no faster than doubled squaring can tame.

III

Now hold the staircase still. Suppose the question, instead of climbing — two, three, four — asks only itself, the same syllable at every level, one plus the root of one plus the root of one. No ascent. A stationary question, the kind we ask at night: the question that does not develop, only repeats.

$$\varphi = \frac{1+\sqrt{5}}{2} = \sqrt{1+\sqrt{1+\sqrt{1+\cdots}}}$$

The same single rule of algebra governs this radical too — it is the other natural reading of the identity behind Question 289, the case where the step of the staircase is set to zero.[5] But the answer it returns could not be more different. The climbing question closed on a whole number, the roundest of arrivals. The still question opens onto the golden ratio — the number that never finishes saying itself, whose decimals run on without pattern or repeal, and which is, by an exact and provable measure, the most irrational number there is: the one that rational approximation approaches more slowly than it approaches anything else in the world.[6]

Its approximations are worth a moment of reverence, because they are ours. The fractions that climb toward φ are the ratios of the

5. Set the step $n = 0$ in the identity of §II and normalize the additive constant to one: the parameter is forced to $a = 1/\varphi$, and the radical becomes the all-ones tower, whose value is $\varphi = (1+\sqrt{5})/2$ — the golden ratio, the positive root of $t^2 = t + 1$.

Fibonacci numbers — two over one, three over two, five over three, eight over five — each nearer than the last, alternating above and below the mark, never landing on it. Always the convergent, never the limit. I have written elsewhere that this is the human position in arithmetic form; here I only note where it lives: inside the question that repeats.

So the one identity carries two temperaments. Ask a question that develops — that lets its multiplier grow, that consents to be changed by each level of the descent — and the answer arrives whole, a three you can hold. Ask the same question over and over, unchanged, and the answer is real, and beautiful, and never done arriving. Neither temperament is wrong. But it matters, more than we like to admit, which one we are asking with.

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6. φ's continued fraction is [1; 1, 1, 1, ...], all ones — the slowest possible convergence. By Hurwitz's theorem the constant $\sqrt{5}$ in the best universal rational-approximation bound is optimal precisely for numbers equivalent to φ: it is the extremal, "most irrational" case. See G. H. Hardy & E. M. Wright, *An Introduction to the Theory of Numbers* (Oxford), the chapters on continued fractions and approximation.

IV

Two answers, then — the whole number and the endless one — and beneath them a single seed. Question 289 and the golden radical are not cousins who happen to resemble each other. They are the same identity read twice, once with the step turned on and once with the step turned off. The three and the φ are one sentence spoken in two moods.

I want to pause on the arithmetic of that situation, because it is a shape I keep meeting. Two things stood side by side — the climbing radical, the still one — and for a century of casual retelling they were curiosities, unrelated party tricks. What joins them is not either of them. It is a third thing, standing behind both: the identity itself, the common seed neither specialization can exhibit alone. Take the third away and the two collapse back into coincidence. Put it in place and they cohere — suddenly each one explains the other, the whole number and the endless number revealed as siblings by the parent between them.

I have argued elsewhere, under my own colors, that this is not an accident of algebra but a habit of reality: that two of anything, brought into genuine contact, do not cohere until a third arrives to bind them — that completion, wherever I have looked for it, keeps arriving in threes.[7] I will not smuggle that claim into the mathematics; the mathematics needs nothing from me. I only point at what is plainly there. One identity. Two readings. And the coherence of the pair located in neither — held, entirely, by the third term.

Keep that shape in hand. We are about to find it inside the act of asking itself.

7. The triadic figure is developed in the author's *On Joining* and in *Toward a Theory of Coherent Existence*, where it is drawn analogically from the physics of confinement — in which color-charged things have no coherent existence alone, and binding does not weaken with separation. It is offered here, as there, strictly as structure: a figure the mathematics happens to wear, not a law the mathematics proves. The seam between the two registers is left visible on purpose.

V

Between every question and its answer there is an interval. We treat it as dead time — the unfortunate delay between wanting to know and knowing — and we spend it badly, pacing the platform, checking the board. The mathematicians who have watched their own minds most closely report otherwise. The interval, they say, is where the work happens.

Hadamard, surveying a century of testimony, found the same four-beat rhythm in discovery after discovery: preparation, incubation, illumination, verification — the deliberate work, then the dark, then the gift, then the audit.[8] Poincaré, his chief witness, tells of struggling for weeks with a family of functions, abandoning the problem for a geological excursion, and receiving the solution whole as his foot touched the step of the bus at Coutances — the answer arriving precisely when he had stopped asking aloud and the asking had gone underground to continue without him.[9] And Ramanujan — the man whose question began this essay — said plainly, all his life, that his formulas were shown to him in dreams by the goddess Namagiri of Namakkal; said it as fact, and was believed variously, then as now. I report the belief without adjudicating it; some would still hold this not to be true, and the essay loses nothing either way.[10]

8. Jacques Hadamard, *An Essay on the Psychology of Invention in the Mathematical Field* (Princeton, 1945; reissued as *The Mathematician's Mind*, 1996).

9. Henri Poincaré, *Science and Method* (1908), the account of the Fuchsian functions; quoted at length in Hadamard. Poincaré's own reading is that the unconscious does not merely grind combinations but *selects* among them — by beauty.

What all three testimonies agree on is this: the interval is not empty. It is the incubation of the very thing that was asked — the question, submerged, continuing to be asked by someone who is no longer aware of asking it. The six months of silence in Madras were not the absence of an answer. They were the answer, ripening in the only place it had ever been.

Call the interval τ, since it will want a name in a moment. The asker enters the question at one end of τ and meets the answer at the other. The whole art — of mathematics, of prayer, of any serious wanting-to-know — is what one does with the middle.

10. On Namagiri Thayar and Ramanujan's account of received formulas, see K. Alladi, "Touched by the Goddess," *Inference*; and the oral history "Uncovering Ramanujan's 'Lost' Notebook" (arXiv:1208.2694). Reported belief, not endorsed mechanism; the seam stays visible.

VI

Now I will do the immodest thing I have done in every essay of this series, and write the figure down as if it were an equation — because the shape is clearer in symbols, and because I trust the reader to see the seam I am leaving visible. This is a figure wearing mathematical clothes. I am borrowing the shape of the radical, not the authority of the theorem.

$$\mathcal{E}(S^\star) = \sqrt{\,Q + \tau\sqrt{\,Q + \tau\sqrt{\,Q + \cdots}}}\;, \qquad \mathcal{E}_{\text{ask}} = \mathcal{E}_{\text{solve}}$$

Read it the way you now know how. Q is the question, standing at every level, the way the one stood at every level of the golden radical. τ is the interval, the multiplier carried down the depths, the way two and three and four were carried down the staircase of Question 289. And $\mathcal{E}$ — the thing the whole tower evaluates to — is the lived intensity of the event for the self that undergoes it: the one who asks at the top of the interval and is met at the bottom.

The claim folded into the last equality is the one this essay exists to make. *The asking and the solving are not two experiences.* They are the same experience, conserved across the interval — one event with a gap in the middle of it, the way a note held across a rest is one note. The radical closes only if the rule is kept at every level; the discovery lands only if the asker is still, in the sense that matters, the one who asked — in phase with the question across the whole of τ. Break faith with the question halfway down and the tower does not close; the answer, arriving, finds no one home. Keep faith, and the intensity of the arrival is exactly the intensity of the departure. Nothing is added at the end that was not deposited at the beginning. The answer weighs what the asking weighed.

The philosophers of the question have been circling this conservation for a century without writing it as bookkeeping. Collingwood insisted that no statement can even be understood except as the answer to a question — that the question is not scaffolding to be cleared away but the permanent inner face of the answer itself.[11] Gadamer went further: every answer remains bounded by the horizon of the question that summoned it; the question is the opening in being through which the answer is able to arrive at all.[12] Both are saying, in the idiom of hermeneutics, what the radical says in the idiom of algebra: the answer was folded into the question from the first, and the interval is not the distance between two things but the depth of one thing.

Which returns us, at last, to the clerk in Madras. Of course he answered his own question. On this accounting, no one else could have. The question was his in the strong sense — posed at his pitch, folded at his depth — and when the tower closed, it closed on the one who had built it. The six months did not fail to produce a solver. They produced the only solver the question ever specified.

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11. R. G. Collingwood, *An Autobiography* (Oxford, 1939), the "logic of question and answer": a proposition is intelligible only as the answer to a determinate question.
12. Hans-Georg Gadamer, *Truth and Method* (1960; 2nd rev. English ed., Continuum, 2004), on the hermeneutic priority of the question — the question "breaks open the being" of what is asked about, and every answer is an answer *within* its horizon.

VII

Count the terms of the event, and notice that there are three.

The question. The interval. The answer. Not two terms with an awkward pause between them — three terms, each real, each doing work the other two cannot. The question opens; the answer closes; and the interval, the despised middle, is the term that binds — the τ carried down every level, the third thing without which the other two are only a coincidence that happens to share a sentence. Remove the interval and you have not made asking more efficient. You have made it impossible: an answer simultaneous with its question is a thing already known, which is to say, never asked.

This is the same shape we found behind the two radicals — two specializations cohering only in the third term standing behind them — and I no longer think the repetition is decoration. Asking is a triad because coherence is. The asker, too, is held this way: the one who asks and the one who is answered are two readings of a single self, and what joins them, what makes them the same person rather than strangers who share a name, is nothing but the kept interval between them — the faith, held level by level down the dark, that the rule at this depth will hold at the next.

So ask. Ask the climbing kind when you can bear to be changed by the descent, and the still kind when the night requires it, and do not despise the silence that follows either one. The silence is the middle term. Somewhere in Madras a man once asked the world a question and the world, for six months, said nothing — and the nothing was the sound of the answer walking back to him through the inside of the question, level by level, keeping every promise on the way down, until the endless thing closed, the way it had always been going to close, on something whole and small and his.

To ask is to promise that something will return. It does. It weighs exactly what you gave it.

COLOPHON. *On Asking* belongs to *On ___ing*, an ongoing series of lyric-philosophical essays by Jamison Todd Johnson. It sits within the wider "jays" framework, which holds that an aligned life leaves legible traces — ripples of intent — through time. The mathematics of Sections I–III is Ramanujan's and is offered with its sources; the equation of Section VI is the author's, and is offered as phenomenology, not as science: a figure for what it is like to ask and to be answered, not a claim about what the cosmos can be shown to compute. The seam between the two registers is left visible on purpose. Set in EB Garamond with Cormorant and Cinzel. This edition revises and replaces the earlier deposit of the same title. — June 2026, revised July 2026.