

The Clinical Encounter, and the Space of Human Freedom

Julian Ungar-Sargon*

Former Clinical Director, PA Program, Borra College of Health Sciences, Dominican University, River Forest, Illinois, USA

***Corresponding author:** Julian Ungar-Sargon, Former Clinical Director, PA Program, Borra College of Health Sciences, Dominican University, River Forest, Illinois, USA

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ABSTRACT

This essay argues that the mathematics of π supplies medicine with a metaphor that is not decorative but load bearing: a structural model of the relation between a finite descriptive procedure and an exhaustively real object. Written for a clinical readership, it develops the mathematics in some detail incommensurability, the Archimedean bracketing method, rates of series convergence, Lambert's proof of irrationality, Lindemann's proof of transcendence, the unresolved question of normality, and the appearance of π throughout the quantitative apparatus clinicians use daily before turning to the philosophical and theological registers in which the same structure has long been described. Drawing on Maimonides' remarkable twelfth-century assertion that the circle ratio is unknowable in principle, on Nicholas of Cusa's polygon that never becomes a circle, and on the Lurianic doctrines of tzimtzum and tikkun, I argue that all three describe an irreducible interval between faithful approximation and inexhaustible reality. I then take up explicitly the question of what makes a medical metaphor legitimate rather than merely evocative, using Black's interaction theory and Ricoeur's account of metaphorical truth, and testing the π metaphor against the cautionary case of the military metaphors of oncology. The final sections apply the model to clinical practice: diagnosis as legislated rounding, the consultation as decimal expansion, premature closure as the characteristic iatrogenic sin, and palliative care as the mature acceptance of a remainder that will never be eliminated. Freedom, on this account, is not a property of the object but of the agent who must act within an interval that will not close.

Keywords: π ; Irrationality; Approximation; Clinical Epistemology; Metaphor; Tzimtzum; Diagnostic Error; Free Will; Philosophy of Medicine

Three Scandals

Every child can draw a circle. It is the first form the hand produces without instruction the sun, the face, the wheel, the eye. It is also the figure that ancient cosmology treated as the emblem of perfection: the orbit that returns upon itself, the shape without beginning or end, the form Aristotle assigned to the heavens because it alone could move eternally without alteration [1]. If any object in the world were going to yield a clean number, it would be this one. It does not. Concealed within the simplest closed curve is a ratio that no fraction captures, no decimal exhausts, and no compass and straightedge construct. The circle — the emblem of completion — carries the most famous unfinished number in mathematics. This is the first scandal, and it is worth registering how genuinely scandalous it was. The Pythagorean discovery of incommensurable magnitudes, traditionally located in the diagonal of the unit square, was experienced not as an interesting technical result but as a rupture in the moral order of the cosmos [2].

The tradition that Hippasus was drowned at sea for divulging it is almost certainly legend, but legends preserve affective accuracy even when they fail as history. A world constituted by ratio had produced something that was not a ratio. The instruments of description had failed precisely where description was supposed to be easiest. The second scandal is textual. When the Book of Kings describes the molten sea cast for Solomon's Temple, it supplies measurements: ten cubits from brim to brim, thirty cubits in circumference (1 Kings 7:23) [3]. The ratio is three. Not approximately three, in the text's own idiom — three. The Talmud adopts this as halakhic doctrine: anything with a circumference of three handbreadths has a diameter of one (b. *Eruvin* 14a) [4]. Sacred architecture and sacred law both proceed on a value wrong by roughly four and a half percent. The third scandal is clinical, and it is the one I have spent a professional lifetime inside. Medicine's descriptive apparatus — the diagnostic code, the criterion set, the staging system, the confidence interval, the number needed to treat — is a machinery of rounding.

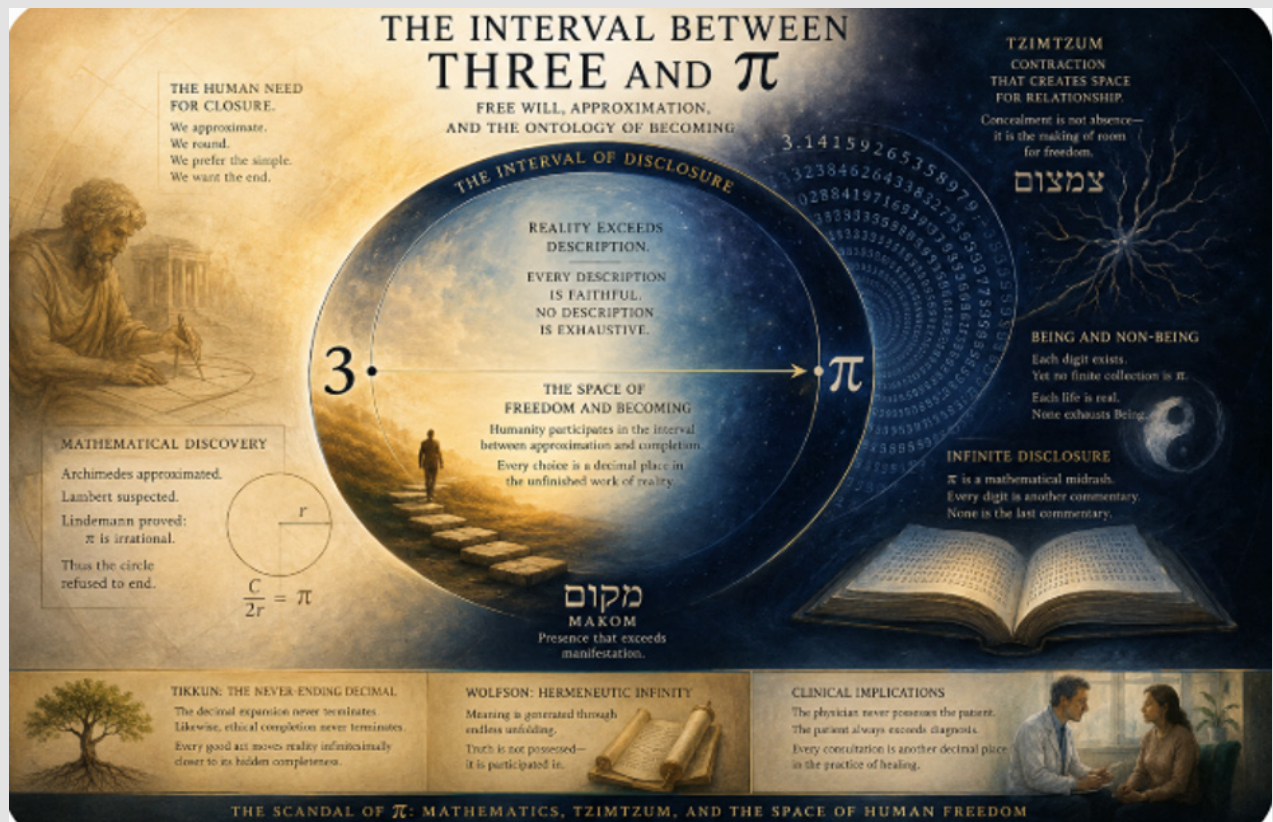
Figure 1: π , -The Interval.

Figure 2.

It converts an inexhaustible particular into a manageable integer. And it works. It works well enough that a physician can act, that a health system can function, that a randomized trial can generate knowledge. But every clinician who has practiced long enough knows the residue. The patient exceeds the chart, and what is left over is frequently the part that matters [5-7]. My claim is that these are not three scandals but one, appearing in three registers, and that the structure they share is the structure of clinical judgment — and, ul-

timately, of freedom. Because the argument is addressed principally to clinicians, I develop the mathematics at greater length than a philosophical essay would normally require. This is deliberate. A metaphor drawn from a discipline one has not troubled to understand is an ornament; a metaphor drawn from a structure one has genuinely examined can do work. I ask the reader who is impatient with the mathematics to persist through Section IV, since the case made in Sections VIII through XI depends on it entirely (Figure 3).

$$e^{i\pi} + 1 = 0$$

Figure 3.

What “Perfect” Means, and why π is not it

A preliminary clarification is required, and it turns out to be more than pedantry. In number theory, a perfect number is a positive integer equal to the sum of its proper divisors: 6 (= 1+2+3), 28, 496, 8128. Euclid gave the construction for even perfect numbers in Elements IX.36, and the concept has nothing whatever to do with π , which is not an integer and therefore not a candidate [8]. When we speak colloquially of π failing to be a “perfect number,” we are not using the technical vocabulary. We are using the older and larger sense, carried by the Greek *teleios* and the Hebrew *shalem*: complete, finished, arrived at its end, lacking nothing further. The distinction matters because the two senses pull in opposite directions. Number-theoretic perfection is a property of an object considered in itself; 28 is perfect whether anyone counts it. Teleological perfection is a property of something in relation to its end. *Shalem* is cognate with *shalom*: wholeness understood as the absence of a remainder, the condition in which nothing is outstanding.

The real question about π , then, is not whether it belongs to a certain arithmetic class. It is whether the world contains, at its foundation, quantities that are *shalem* — quantities that finish. And the answer, established in stages across two millennia, is that it does not, and that this can be proved. I want to retain the imprecision in the colloquial phrase rather than merely correcting it, because the slippage is diagnostic. When we say we expected π to be a “perfect number,” we confess something about the architecture of human expectation. We

expect the ground of things to terminate — a final integer, a last decimal, a fundamental particle not made of anything, a diagnosis that names the whole of what is wrong. The expectation runs so deep that its violation registers as scandal rather than as fact. Section XI will argue that this same appetite, operating in the clinic, is the engine of diagnostic error. Maimonides saw the point with unusual clarity; in a passage I take as the hinge of this essay’s first half. Commenting on the mishnah in *Eruvin* that assumes a ratio of three, he explains that the true relation of diameter to circumference is not known and cannot be stated exactly; that this is not a deficiency in *our* knowledge such that a later generation might supply it, but belongs to the nature of the thing, which is unknowable in principle; and that for this reason the sages adopted the nearest usable number [9].

Written in the twelfth century — six hundred years before Lambert proved irrationality and seven hundred before Lindemann proved transcendence — this is remarkable. Maimonides is not saying the ratio is difficult to compute. He is asserting that its inexpressibility is *ontological rather than epistemic*, a claim he could not possibly have demonstrated, and which turned out, in a precise technical sense, to be true. And he draws the practical conclusion without anxiety: since no exact value is available in principle, the law takes three. Three is not an error. It is a decision made in full knowledge that no non-decision was on offer. Clinicians make several hundred such decisions a week, and I have argued elsewhere that the willingness to name a stopping-point without mistaking it for an arrival is the central epistemic virtue of the clinician [10] (Figure 4).



Figure 4.

The Molten Sea and the Legislated Remainder

The halakhic treatment of the ratio deserves closer attention, because it models something medicine does badly and could learn to do well. The talmudic value is not presented as a measurement. It is a *shiur* — a legal quantity, a stipulated measure. The governing principle appears in the same tractate: the measures of the sages are what they are (b. *Eruvin* 4a) [4]. A *shiur* is not a claim about the world that a better ruler could falsify. It is a threshold established so that ordinary people can apply the law under ordinary conditions without a laboratory. The Tosafists understood the value was inexact and discussed the discrepancy openly, as did a long line of later halakhists; Tsaban and Garber have traced this literature carefully, including the various attempts to reconcile the received value with better approximations [11]. The tradition did not experience the gap as a crisis, because it had never confused the legal quantity with the physical one. The *shiur* is a deliberate rounding whose deliberateness is part of its meaning.

It says: *here is where we stop, and we stop here for reasons of practice, not because reality stopped.* This is a sophisticated epistemic posture, and its sophistication is easy to miss. It is neither naïve realism (three is the ratio) nor skepticism (nothing is measurable, so measurement is arbitrary). It is a third thing: the acknowledgment that action requires termination, that termination is always premature, and that the honest response is to legislate the terminus explicitly rather than pretend it was discovered (Figure 5). Every diagnostic threshold in modern medicine has exactly this logical form and almost none of this self-awareness. A fasting plasma glucose of 126 mg/dL is a *shiur* [12]. A blood pressure of 130/80 mm Hg is a *shiur*, and the fact that it was 140/90 until 2017 is instructive: the underlying physiology did not change on the day the guideline did [13]. The requirement of five symptoms from a list of nine for a major depressive episode is a *shiur* [14]. Each is defensible. Each is a stipulated stopping-point drawn across a continuous distribution so that clinicians can act.

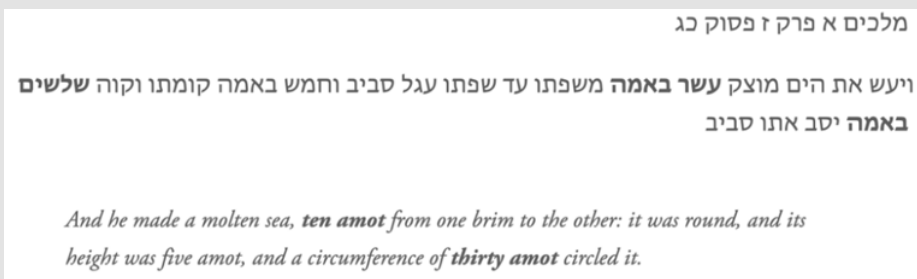


Figure 5.

And each is routinely mistaken — by clinicians, by patients, by insurers, and by the electronic record itself — for a natural boundary, a place where the world changes state, rather than a place where we agreed to stop counting. Kendell and Jablensky made the essential distinction two decades ago in psychiatry: a diagnostic category may be *useful* without being *valid*, and the two questions must be kept apart [15]. Feinstein's programme of clinimetrics made the parallel argument for clinical measurement generally, insisting that the quantities clinicians use is constructed instruments requiring the same scrutiny as any laboratory assay, not transparent windows onto nature [16]. Both are describing *shiurim*. Neither so far as I know, noticed that a legal tradition had worked out the epistemology a millennium earlier and had, crucially, built the acknowledgment of arbitrariness into the doctrine itself rather than leaving it to methodologists to point out afterward [17,18]. There is a well-known homiletic gloss on the Kings verse that I mention with an explicit caveat about provenance. The word for "line" in 1 Kings 7:23 is written **הוּק** but read **וק** — a *ketiv/qere* discrepancy of the sort scattered through the biblical text.

The numerical values of the two spellings are 111 and 106; their ratio is approximately 1.0472, and three multiplied by 1.0472 gives 3.1416, which is π to four decimal places. This derivation is neither talmudic nor medieval. It appears to originate in the mid-twentieth century, and as an argument it is plainly retrofitted; Tsaban and Garber survey it and related claims with appropriate scepticism [11]. One can extract almost any constant from a sufficiently free choice of *gematriot*. I nonetheless keep it, for a reason unrelated to whether it is true. The structure of the claim is the structure this essay is about. The correction factor is in the gap between what is written and what is read. The surplus lives in the interval between the text as inscribed and the text as received. That is not numerology; that is a reasonably exact description of what reading is. Whether or not the sages encoded π in a *ketiv/qere*, the gloss identifies correctly where surplus meaning is generated in a textual tradition: not in the letters, and not in the recitation, but in the difference between them. Hold that thought. In Section XI it becomes a description of the clinical encounter (Figure 6).

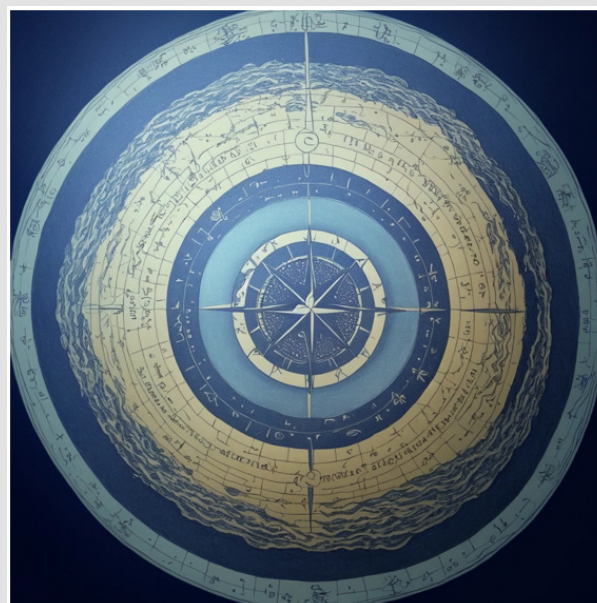


Figure 6.

A Clinician's Mathematics of π

What follows is the technical core. I have tried to make it genuinely accessible without making it false, and to say clearly at each stage what was proved, since the argument of the later sections depends on the difference between “we cannot yet” and “we cannot, and here is the proof.”

Why the Ratio Exists at all

All circles are similar: any circle can be scaled onto any other. It follows that the ratio of circumference to diameter is the same for every circle in the plane, from a capillary in cross-section to the orbit of a planet. This constancy is not obvious and was not obvious to antiquity; it is a theorem, not an observation [8]. π is therefore not a measurement of some circle but a structural constant of Euclidean space itself. That already carries a clinical resonance worth noting. The constant is not extracted from any single instance; it characterizes the relation that all instances share. Clinical science works in the same direction — from the population to the structure — and Section XI will ask what happens when that structure is applied back to a single instance.

What “Irrational” Means

A rational number is one expressible as a ratio of two integers, a/b . Every rational number, written in decimal, either terminates ($1/8 = 0.125$) or falls into permanent repetition ($1/7 = 0.142857142857\dots$). This is not a coincidence but a consequence of long division: dividing by b , only b possible remainders can occur, so within b steps a remainder must repeat and the pattern must cycle. An irrational number is one that is *not* so expressible, and its decimal expansion therefore neither terminates nor repeats — ever. The classical proof that $\sqrt{2}$ is irrational takes three lines and is worth having, because it exhibits the shape of the whole enterprise. Suppose $\sqrt{2} = a/b$ in lowest terms. Then $a^2 = 2b^2$, so a^2 is even, so a is even, so $a = 2k$, so $4k^2 = 2b^2$, so $b^2 = 2k^2$, so b is even too — contradicting “lowest terms.” The proof does not compute anything. It demonstrates that a certain kind of expression cannot exist. This is the characteristic move of the field, and it is why results about π are not statements about the state of our computing power [2]. A clinician should note the epistemic type. This is not a null result, an absence of evidence, or a limit of current technique. It is a positive demonstration of impossibility — a form of knowledge medicine possesses very little of, and one whose closest clinical analogue is perhaps the recognition that certain questions cannot be answered by the trial design proposed (Figure 7).

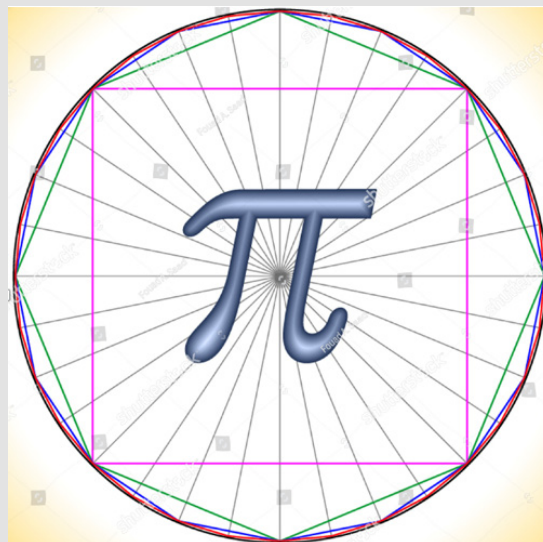


Figure 7.

Archimedes: Knowledge as a Bracket

(third century BCE), produced the first rigorous estimate [19]. His method was to inscribe a regular polygon inside a circle and circumscribe another outside it. The inscribed polygon's perimeter is necessarily too small; the circumscribed polygon's is necessarily too large;

the circle is trapped between them. Doubling the number of sides tightens the trap. Starting from a hexagon and doubling four times to a 96-sided polygon, he obtained

$$223/71 < \pi < 22/7, \text{ that is, } 3.14085 < \pi < 3.14286$$

Two features of this deserve emphasis for a clinical readership.

First, Archimedes did not produce a value; he produced an interval, together with a procedure for narrowing it. He knew exactly how wrong he might be, and in which direction on each side. This is the epistemically honest form of a quantitative claim, and it is precisely the form of a confidence interval — a point that will matter when we come to the clinical use of statistics. The Archimedean bracket is arguably the first formal recognition in the history of science that the *width of one's uncertainty* is itself a reportable quantity. Second, the procedure never terminates. One can always double again. Each doubling is genuine progress, and no doubling is the last. There is no number of sides at which the polygon becomes the circle.

Convergence, and the Clinical Economics of Information

Once infinite series were available, π could be computed by summation rather than geometry, and here the mathematics delivers a lesson that maps onto diagnostic strategy with almost embarrassing directness.

The Gregory–Leibniz series is beautiful and nearly useless:

$$\pi / 4 = 1 - 1/3 + 1/5 - 1/7 + 1/9 - \dots$$

It converges, but at a glacial rate: obtaining ten correct decimal places requires on the order of ten billion terms [20]. Machin's formula of 1706, by contrast, uses two arctangent expansions and yields around 1.4 digits per term; Ramanujan's 1914 series produce about eight digits per term [21]; and the Chudnovsky brothers' 1988 formula, still the basis of essentially all record computations, delivers roughly fourteen digits per term [22]. The mathematical object is identical in every case. What differs is the *yield of information per unit of computational effort*. Two investigators pursuing the same quantity with different methods are not equally efficient, and the difference is not marginal — it is the difference between ten billion operations and one. Every clinician recognizes this without having named it. A carefully taken history and a competent examination are the Chudnovsky formula: enormous informational yield per unit of time. A panel of undirected laboratory tests ordered because the differential is unclear is Gregory–Leibniz: it converges, eventually, at ruinous cost, and often the physician exhausts the available resources before arriving anywhere. The question in a difficult case is rarely “can more be known?” It is “what is the highest-yield next term in this expansion?” — which is what a good consultant is for.

Lambert (1761): the Expansion does not Repeat

Johann Heinrich Lambert proved that π is irrational, by way of a continued-fraction expansion for the tangent function, demonstrating that if x is rational and non-zero then $\tan x$ is irrational [23]. Since $\tan(\pi/4) = 1$, which is rational, $\pi/4$ cannot be rational, and neither

can π . Niven's much later one-page proof, requiring only integration by parts, is the version most non-specialists can follow and is worth an hour of any curious clinician's time [24]. What Lambert established is that no fraction, however baroque, equals π ; and therefore, that the decimal expansion neither terminates nor cycles. The digits go on, without pattern of the repeating kind, forever.

Lindemann (1882): the Circle cannot be Squared

Hermite proved e transcendental in 1873 [25]. Nine years later Lindemann adapted the method to π and proved it transcendental as well — that is, π is not the root of any polynomial equation with rational coefficients [26]. This settled, after twenty-four centuries, the problem of squaring the circle. One cannot construct with compass and unmarked straightedge a square equal in area to a given circle. Not because no one has been ingenious enough. Because it is impossible, and the impossibility is a theorem. I want to underline what this does and does not say. It does not say that π is unknowable, vague, indeterminate, or mysterious. π is among the most thoroughly known objects in mathematics; its definition is exact and it can be computed to any precision desired. What Lindemann established is that π lies outside a particular class of *finite constructive procedures* — that the algebraic and geometric tools sufficient for most of classical geometry do not reach it. The object is fully determinate. Our means of finite construction are not. There is a historical irony worth pausing on. “Squaring the circle” became the proverbial name for futility. But the futility was not established by failure; it was established by *proof* — a piece of successful knowledge whose content is the announcement of a permanent limit. The demonstration that one cannot get there is itself an arrival. Medicine has few results of this type and would benefit from more of them; a great deal of clinical effort is expended on quantities that are, in the relevant sense, unconstructible from the data available.

What Remains Unproved: Normality

Honesty requires noting what is not known. It is unproved whether π is normal — that is, whether every finite digit sequence occurs in its expansion with the expected frequency. It is universally conjectured and consistent with every statistical test yet applied, but there is no proof [27]. The recent computation of 314 trillion digits, which took a single server 110 days, established empirically that every possible thirteen-digit combination occurs somewhere in the sequence [28]; it proves nothing about the fourteen-digit case, and no computation ever will. The record itself makes a point better than any argument I could construct. Thirty-one decades of increasingly heroic computation — from 96-gon to a rack of NVMe drives running for four months — have changed our knowledge of π 's *digits* enormously and its *status* not at all. We are no closer to the end than Archimedes was. There is no closer (Figure 8).



Figure 8.

When is Enough Enough? The Thirty-Nine Digit Answer

And yet: thirty-nine decimal places of π suffice to compute the circumference of the observable universe to within the width of a hydrogen atom [29]. Spacecraft navigation uses fifteen or sixteen. No engineering problem has ever required more. I raise this because it is the strongest practical objection to everything, I want to argue, and it must be met head-on rather than buried. If thirty-nine digits close the question for every conceivable physical application, then in what sense is the interval real? Has not π been, for all practical purposes, finished?

The answer is that practical sufficiency and structural non-termination are different claims, and the confusion of the two is exactly

the error I am concerned with. Thirty-nine digits are sufficient for a stated purpose, to a stated tolerance. The sufficiency is a property of the pairing of number and task, not of the number. Change the task and the sufficiency evaporates. And critically: the person who knows that thirty-nine digits suffice *knows something the person who thinks π equals 3.14159 does not* — namely, the size and location of his own remainder. This is precisely the clinical distinction I care about. A physician who stops the workup because he has what he needs for the decision at hand is practicing well. A physician who stops because he believes he has arrived at the patient is practicing badly. The two may order identical tests and write identical notes. They are not doing the same thing, and the difference will show up on the next visit (Figure 9).

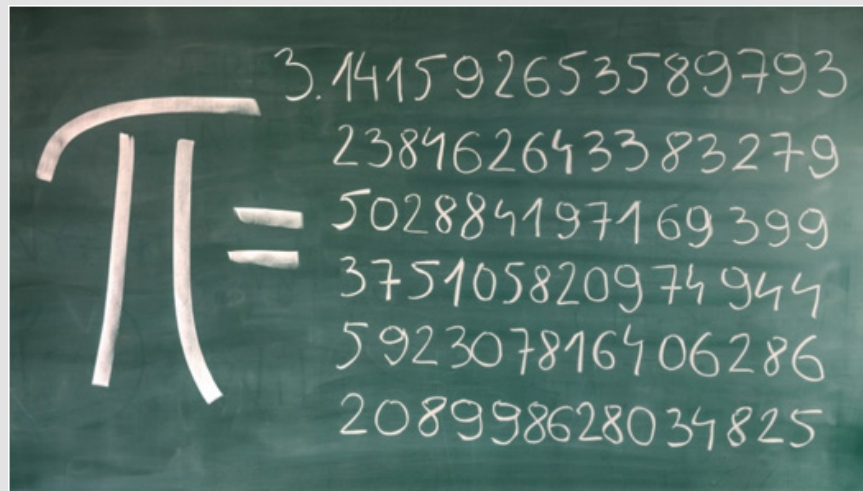


Figure 9.

π where there are no Circles

The final and, for a clinical audience, the decisive mathematical point: π appears throughout the quantitative apparatus of medicine, in places containing no circles at all.

The normal distribution. The probability density of the Gaussian is

$$f(x) = \left(1/\sigma\sqrt{2\pi}\right) \cdot e^{-\left((X-\mu)^2/2\sigma^2\right)}$$

The normalizing constant contains π . It is there because the integral of e^{-x^2} over the real line equals $\sqrt{\pi}$ — a fact with no geometric circle anywhere in sight [30]. Every reference range, every z-score, every standard deviation, every p-value, and every confidence interval a clinician has ever used rests on a curve whose very definition requires π . There is no laboratory report in any hospital in the world that does not have π built into its architecture.

The Basel problem. Euler showed in 1735 that the sum of the reciprocals of the squares — $1 + 1/4 + 1/9 + 1/16 + \dots$ — converges to $\pi^2/6$ [31]. Nothing in that series has anything to do with circles. π simply arrives.

Buffon's needle. In 1777 Buffon posed the following: drop a needle of length L at random onto a floor ruled with parallel lines a distance d apart. The probability that the needle crosses a line is $2L/\pi d$ [35]. One can therefore *estimate π by throwing needles*. This is the first Monte Carlo method, two centuries before the name [33] — and it is worth noting that Lazzarini's celebrated 1901 experimental determination of π to six decimal places by this technique is almost certainly fraudulent, the trial count having been chosen to produce the known answer [34]. Even in the purest of domains, an investigator who knows the result he wants can arrange to obtain it. The clini-

cal resonance here is exact. A randomized trial is Buffon's floor: an underlying deterministic quantity is estimated by accumulating stochastic events, and the estimate converges as the square root of the sample size — slowly, expensively, and never to a point. And Lazzarini is every investigator who stops the trial when the interim analysis looks favorable.

Poiseuille's law. Flow through a cylindrical vessel:

$$Q = \pi \Delta P r^4 / 8 \eta L$$

π sits in the numerator of the equation governing vascular and airway resistance [35]. Every cardiologist's intuition about the hemodynamic significance of a stenosis, every pulmonologist's account of why a small reduction in bronchial radius produces catastrophic obstruction, is an application of a formula containing π . Fourier analysis, and therefore every image the reader has interpreted this week. The Fourier transform, whose kernel is $e^{-2\pi i f t}$, underlies magnetic resonance image reconstruction — the raw MRI signal is acquired in the frequency domain and π appears in the transform that turns it into an anatomical image [36]. The same mathematics underlies EEG spectral analysis, evoked potentials, pulse oximetry, and ultrasound [37]. A neurologist who reads an MRI and a quantitative EEG in the same afternoon has used π twice before lunch without noticing. I labour this point because it disposes of a plausible dismissal. One might say that π is a curiosity of geometry with no bearing on medicine, and that any connection drawn between the two must therefore be poetic. That is simply false. π is not adjacent to clinical quantification; it is inside it, at the level of the normalizing constant. The constant that cannot be finished is embedded in the instruments with which we finish things (Figure 10).



Nicolaus of Cusa

Figure 10.

Cusanus: The Polygon that Never Becomes the Circle

Between Archimedes and Lambert stands a figure who read the polygon construction as an epistemology, and whose formulation is the most useful bridge from the mathematics to everything that follows. Nicholas of Cusa, in *De docta ignorantia* (1440), takes the inscribed polygon as the governing image of the finite intellect approaching truth [38]. Increase the number of sides and the polygon approaches the circle. Increase it without limit and the approach continues without limit. But the polygon never becomes the circle. There is no number of sides at which the transition occurs. The polygon remains polygonal, angular, constituted by the very vertices that distinguish it from the smooth curve it approximates. Cusanus draws the conclusion with precision, and it is not scepticism. The finite intellect's relation to truth is one of endless approximation in which each approximation is genuinely closer and none is adequate. This is learned ignorance: not the ignorance of one who knows nothing, but the ignorance of one who has learned what kind of thing knowledge is. The learned ignorant knows more than the naïve knower precisely by knowing the character of the remainder — which is, exactly, the thirty-nine-digit distinction of Section IV.8 [10].

Three consequences follow, and each will reappear clinically. *First, the approximations are ordered.* Ninety-six sides are better than six. Fifteen decimal places are better than three. The interval genuinely narrows. Nothing here licenses the claim that all descriptions are equally good, and any reader who takes this essay for an argument that clinical knowledge is merely constructed has misread it.

Second, the improvement is asymptotic in a specific sense: each step is real, no step is final, and the two facts do not cancel. Most bad epistemology consists of letting one of them erase the other — collapsing either into the fantasy of eventual closure or into the despair that says approximation is worthless because it never finishes. Medicine contains conspicuous examples of both. *Third, the gap between polygon and circle is not a quantity reducible to zero by sufficient effort.* It is a *difference of kind* wearing the costume of a difference of degree. The angular and the curved are not two positions on one scale. This is why the coincidence of opposites, for Cusanus, belongs to the infinite alone: only there do polygon and circle coincide, and the infinite is not a place we occupy.

The theological transposition is Cusanus's own. God is to the created intellect as the circle is to the polygon: truly approached, never comprehended, and the non-comprehension is not a scandal but the correct relation. To have comprehended would have been to have got it wrong, since a comprehended infinite is a contradiction in terms. I press one step beyond him, in a direction his image permits. The interval between polygon and circle is not empty. It is not the mere absence of coincidence. It is the space in which the work of approximation occurs where the doubling of sides takes place, where computation lives, where the entire activity of mathematics is conducted. Abolish the interval and you have not achieved knowledge; you have abolished the conditions under which knowing is an activity at all (Figure 11).

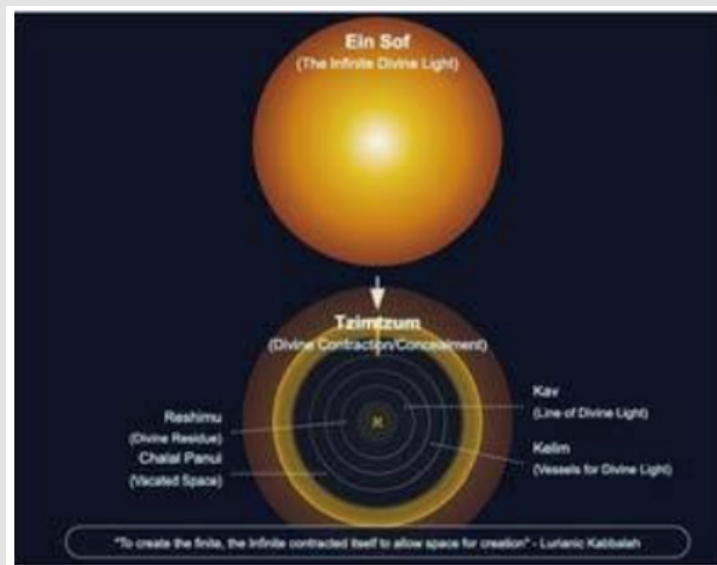


Figure 11.

Tzimtzum: Contraction as the Manufacture of Interval

The Lurianic account of creation is, in its formal structure, a doctrine about the production of an interval, which is why it seems to me the natural theological home for everything said so far. Before creation, in Isaac Luria's telling as transmitted by Hayyim Vital, there is nothing but the *Or Ein Sof*, the undifferentiated light of the Infinite, filling all [39]. The first act is not emission but withdrawal: *tzimtzum*, the contraction of the light from a point, producing the *halal ha-panui*, the vacated space. Only then does a thin ray, the *kav*, re-enter the vacancy; and only within the vacancy can vessels be formed, worlds emanate, and beings exist that are not simply God. Scholem's account remains the classic introduction [40], Idel's the necessary corrective to its emphases [41], and Magid's the most useful for the doctrine's later metamorphoses [42]. Three features bear directly on this essay. The vacancy is a condition of otherness, not a defect. Nothing can exist alongside an undifferentiated infinite. For there to be another, there must be a *place* — and *Makom*, place, is among the classical rabbinic names for God, so the divine name itself carries the paradox that the maker of place is the place [43–45]. Withdrawal is not diminishment. It is the making of room. A God who did not withdraw would not be more present; there would simply be no one for whom presence could be present.

The vacancy retains a residue. The *reshimu* — the impression left in the emptied space, as scent remains in an emptied vessel — is essential to the doctrine. The vacancy is not sterile nothing; it is nothing-marked-by-what-was-withdrawn. I know of no better phenomenology of an approximation. Three is not the absence of π ; three is π 's trace at the resolution available to us. The remainder is not what is

missing but what is *impressed*. The vessels break. *Shevirat ha-kelim* is, at bottom, an account of the inadequacy of any container to the light it is meant to hold. The vessels do not shatter through faulty workmanship or divine inattention. They shatter because finitude cannot hold infinity — and the attempt to hold it is nonetheless the only way anything gets made [46–48]. What follows is the scattering of the sparks, the *nitzotzot* lodged in the *kelipot*, and the human vocation of *tikkun*: a repair proceeding ones act at a time, one spark at a time, which no individual completes.

Set these three beside the mathematics and the parallel is close enough to be uncomfortable. Contraction produces a space in which finite description becomes possible at all. The finite description carries a real trace of what exceeds it. No finite description holds what it describes; every vessel breaks; and the response is not to stop constructing vessels but to keep raising sparks, in a labour that is genuine, cumulative, and unfinishable. This is also the register in which the twentieth century forced the doctrine to be reread. Hans Jonas, confronting the Shoah, was driven to a myth of divine self-limitation: a God who, in granting the world its own being, surrendered the power to intervene in it, and who is therefore not omnipotent in the traditional sense but suffering, becoming, and dependent upon human action for the completion of the divine purpose [49]. Jonas arrived at a *tzimtzum*-shaped theology under duress and largely from outside the tradition, because the alternative — a God who could have intervened and did not — had become unbearable. Fackenheim's response ran differently, refusing both theodicy and abandonment [50].

Whatever one makes of either, the structural point stands: the withdrawal that makes room for human freedom is the same withdrawal that makes room for atrocity. There is no version of this doc-

trine in which the interval is safe. The space permitting response equally permits refusal, and the tradition's own language of *hester panim*, the hiding of the face, names that ambivalence without resolving it [51]. Any account presenting the unfinished character of the world as merely beautiful has not been paying attention. The interval

is where healing happens. It is also where harm happens. That it is the site of both is not an objection to the analysis; it is the analysis, and Section XI will show that clinical harm and clinical care occupy the same space (Figure 12).

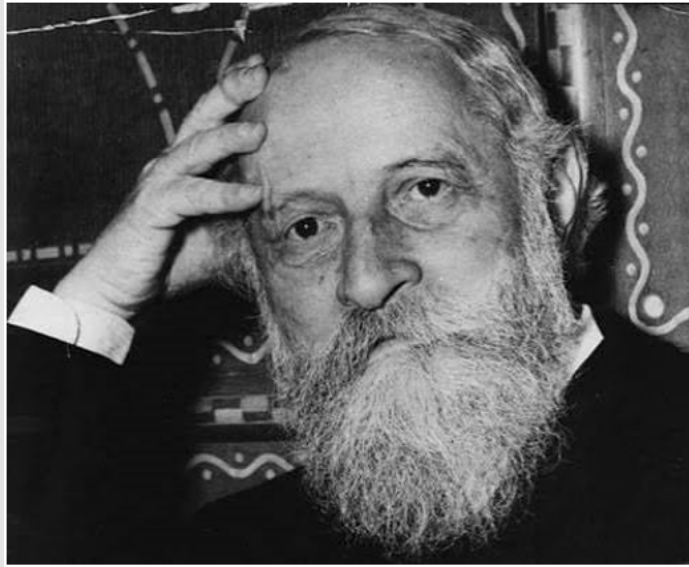


Figure 12.

The Ontology of the Between

If the interval is where the work happens, it deserves an ontology of its own rather than treatment as the leftover after two entities have been described. Martin Buber's category of *das Zwischen*, the between, was formulated precisely against the assumption that relation is a secondary property of prior substances [52]. For Buber the I-Thou is not a transaction between two independently constituted selves; the selves are constituted in the encounter. The between is not empty space traversed by relation. It is the ontological locus of relation, and it is real — neither a psychological state inside one party nor a physical fact outside both, but a third thing with its own mode of being. Emmanuel Levinas radicalizes this in a direction directly useful here. The face of the other, in *Totality and Infinity*, is characterized by its overflow of any idea I can form of it: the other is precisely what exceeds my concept of the other, and the ethical relation begins in that excess [53]. Levinas's term for the excess is *infinity*, in a sense close to Descartes's third meditation — the idea whose *ideatum* surpasses the idea. What matters for my argument is the ethical valence he assigns it. The excess is not an epistemic frustration. It is the source of *obligation*. I am commanded by the other exactly at the point where I fail to comprehend him. Comprehension would be totality, and totality is,

for Levinas, the structure of violence: the reduction of the other to a term within my system. Elliot Wolfson supplies the third element.

Across his work on the kabbalistic imagination, and particularly in his analyses of the secret disclosed only as secret, Wolfson develops an account of meaning generated through unending hermeneutic unfolding rather than through arrival at a final signified [54–56]. The concealed is not a content awaiting revelation; concealment is the mode in which disclosure occurs. To reveal the secret as secret is not a failure to reveal it — it is the only revelation there is. The corollary is that interpretation does not converge on a terminus: each reading opens further reading, and the tradition is constituted by the non-closure. Gadamer's account of the hermeneutic circle and the fusion of horizons arrive at a formally similar result from a different direction [57]. Put Buber, Levinas, and Wolfson together with Cusanus and Luria and the shape is clear enough to state as a thesis: (Figure 13) I have developed the clinical form of this thesis across a series of papers on the space between healer and patient, on the *tzimtzum* model of the doctor–patient relationship, and on the paradox of presence and absence in the therapeutic encounter [6,58]; what the present essay adds is a formal analogue for which the non-closure is not asserted but proved (Figure 14).

Truth is disclosed in the interval between a faithful approximation and an inexhaustible reality. The interval is not a deficiency to be eliminated but the site at which relation, meaning, and obligation occur. To close it would not be to achieve knowledge; it would be to abolish the conditions of knowing, and with them the conditions of ethics.

Figure 13.

How conceptual metaphors form

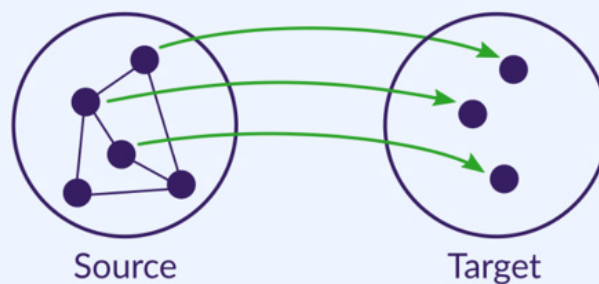


Figure 14.

Is π a Legitimate Metaphor? Criteria for a Load-Bearing Analogy

I now owe the reader an argument rather than an accumulation of resemblances. Medicine has been badly served by metaphors before, and a clinical readership is right to be suspicious of a physician arriving with a mathematical constant and a theological doctrine and proposing to reorganize the consultation around them.

Why “Just a Metaphor” is the Wrong Dismissal

The received folk view treats metaphor as ornamental substitution: a decorative way of saying something that could be said plainly, adding vividness but no content. It descends, in attenuated form, from Aristotle’s definition in the *Poetics* — metaphor as the transfer of an alien name, and the mark of genius as an eye for likeness [59] — though Aristotle himself, who thought metaphor a form of learning, held a stronger view than the one that reached us. On the attenuated view, calling the patient “ π ” is at best a mnemonic. That view has not

survived twentieth-century philosophy of language. Max Black’s *interaction* theory holds that a metaphor is not a comparison between two pre-existing descriptions but a device in which a *system of associated commonplaces* belonging to one subject is applied to another, organizing the second in ways not otherwise available [60]. The metaphor does not report a similarity; it *generates* a structure. Black’s examples are deliberately technical — the model in physics, the analogue in engineering — because his target is precisely the assumption that metaphor is a poetic rather than an epistemic instrument. Ricoeur develops this into a full account of *metaphorical truth* [61].

A living metaphor, on his analysis, operates by a suspension of literal reference that permits a second-order redescription of reality; the copula of metaphor is simultaneously and “is not,” and the tension between them is what does the work. A metaphor that collapses into simple identity (“the patient is a number”) is dead; so is one that collapses into pure difference (“the patient has nothing to do with numbers”). The productive metaphor holds both. Lakoff and Johnson then established empirically what Black and Ricoeur argued

philosophically: that conceptual metaphors are not decorations on thought but the structures within which thought and action are organized, largely below the level of awareness [62]. The consequence for medicine is uncomfortable. We do not get to choose whether the clinical encounter is structured by metaphor. It already is — by the body-as-machine, by the disease-as-invader, by the patient-as-consumer, by the encounter-as-transaction. The only available choice is which metaphors, examined or unexamined. My own prior work has argued for the parable/mashal as the governing form of clinical understanding, and this essay should be read as a continuation of that argument by other means [63-66].

The Cautionary Case: what a Bad Medical Metaphor does

Sontag's argument in *Illness as Metaphor and AIDS and Its Metaphors* remains the necessary warning [67]. Her target was the moralization of disease — tuberculosis as a disease of passion, cancer as a disease of repression, AIDS as a disease of transgression — and the mechanism she identified was the smuggling of unwanted *entailments*. A metaphor imports not only its central mapping but the network of associations that travels with it, and the imported network operates whether anyone endorses it. The military metaphor is the paradigm case. Hodgkin catalogued the pervasiveness of “medicine is war” in the mid-1980s [68]; Reisfield and Wilson analysed its specific costs in oncology [69]; and Semino and colleagues have since shown empirically how patients themselves deploy and resist violence and journey metaphors in describing their illness [70].

The entailments are the problem. If treatment is a battle, then the patient who dies has lost; if there are fighters, there are also, by implication, those who did not fight hard enough; if the disease is an enemy, then the body harbouring it is occupied territory rather than a person. None of these implications is intended by the clinician who

says, “we’re going to fight this.” All of them arrive anyway. I have examined the militarized imagination in medicine at length elsewhere, and the fatalism it induces in patients is, in my view, among the most under-recognized iatrogenic effects of medical language [71]. Sontag’s lesson is not that metaphor should be avoided — she was explicit that this is impossible — but that metaphors must be audited for what they bring with them.

Four Criteria

From the foregoing I propose four conditions for a metaphor to be load-bearing in clinical thought rather than merely evocative. I state them generally so that the reader may apply them to my proposal and to the metaphors already operating in his practice.

- 1. Structural isomorphism, not surface resemblance.** The mapping must run between *relations*, not between objects. “The heart is a pump” is strong because the relational structure (pressure, flow, resistance, valves) genuinely transfers. “The mind is a computer” is weaker because the transfer is largely at the level of vocabulary.
- 2. Generativity.** The metaphor must yield claims that would not otherwise have been formulated, and that can be assessed independently. A metaphor that merely relabels existing knowledge is inert.
- 3. Controlled entailments.** The unwanted associations must be identifiable and either absent or explicitly disavowed. This is where the military metaphor fails catastrophically.
- 4. Self-limitation.** The metaphor must specify where it breaks. A metaphor that claims to fit everywhere has become an ideology, and the honest form of a model includes the boundary of its own validity (Figure 15).

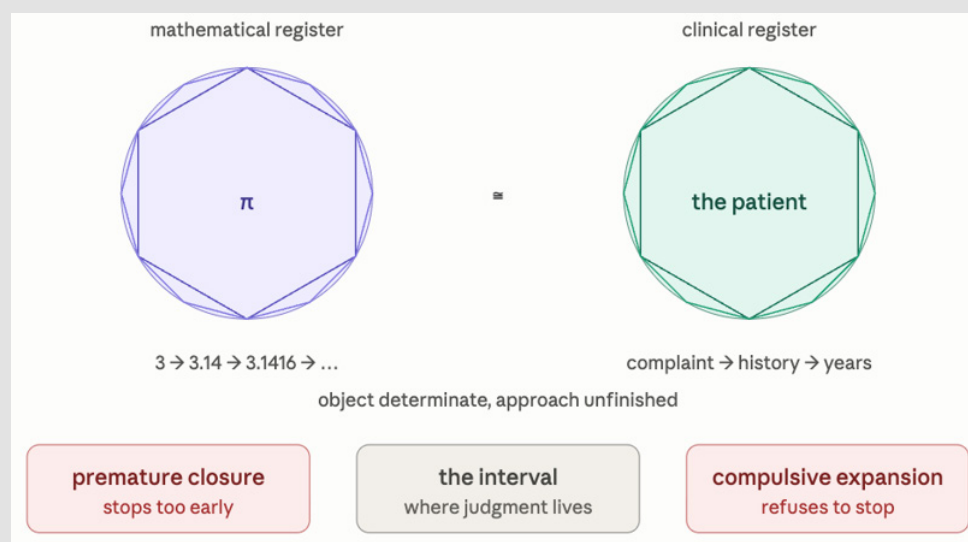


Figure 15.

The π Metaphor Tested

On isomorphism. The mapping I propose is not between π and the patient. It is *between two relations*:

(Figure 16) Relata in each pair matter. In each case: the object is entirely real and entirely determinate; the procedure is finite, ordered, genuinely convergent, and never terminal; the practitioner must stop somewhere; the stopping point is a decision, not a discovery; and the

size of the residue is itself knowable even though the residue is not. That is a structural correspondence of some depth, and it holds at the level of relations rather than of objects. It satisfies (i). Note what the isomorphism excludes, which is as important. It does not map infinitude onto the patient. It does not claim the person is unknowable, mystical, or indeterminate. Section IX takes this up directly. On generativity. The metaphor yields at least six claims that are independently assessable and that I do not think would have been formulated in this form otherwise:

the relation of a finite constructive procedure to a fully determinate mathematical object :: the relation of a finite diagnostic procedure to a fully determinate human being.

Figure 16.

1. Diagnostic thresholds are *shiurim* — legislated stopping-points — and should be presented to trainees and patients as such, with their stipulated character explicit rather than discovered afterwards from the guideline revision history.
2. Continuity of care is not an administrative preference but an epistemic necessity, because a change of clinician resets the expansion to its first significant figure (Section XI.2).
3. Premature closure and over-investigation are the *same* error with opposite signs — both are refusals of the interval — and should be taught together rather than as unrelated biases.
4. The clinician's competence includes knowing the *width* of his current uncertainty, on the Archimedean model, and this is a separately teachable and separately assessable skill.
5. Diagnostic effort should be evaluated by information yield per unit of patient burden, on the model of series convergence rates (Section IV.4), rather than by the number of tests performed.
6. In terminal care the appropriate goal is not the closure of the interval but honest inhabitation of it (Section XI.6).

Figure 17.

(Figure 17) Whether these are *right* is a separate question. That they are substantive, non-obvious, and testable satisfies (ii). On entailments. The dangerous import in a mathematical metaphor is obvious and must be named: quantification carries the association of reduction, of the person as a number, of the very Cartesian objectification that the humanistic critique of medicine has spent fifty years resisting. If the metaphor smuggles in the idea that the patient is a quantity, it has done exactly the harm Sontag warned of. I claim it does not, and that the mapping in fact runs the other way. The metaphor's entire content is that the object exceeds every quantification of it, permanently and provably. It is not a claim that the patient is a number. It is a claim, licensed by a theorem, that no finite description exhausts its object — and it is therefore the strongest available anti-reductionist argument, precisely because it is drawn from the most quantitative discipline there is. The metaphor arms the humanistic case rather than disarming it. That satisfies (iii), though the reader should hold me to it: if the language ever begins to make patients sound like calculations, the criterion has been violated, and the metaphor should be dropped.

On self-limitation. Two places where the analogy breaks:

The circle does not move while Archimedes doubles his polygon; the patient does. Physiology changes, biography accumulates, and the patient alters in response to being examined. The object of clinical knowledge is not static, which makes clinical knowing harder than mathematical approximation, not easier, and means the expansion image understates the difficulty. It also means the physician is causally implicated in what he is trying to know — something with no mathematical analogue whatsoever. *Mathematics has no deadline; medicine has nothing but deadlines.* Archimedes could always compute one

more digit. The clinician must act on the digits in hand, within the time available, and the time is frequently determined by the disease rather than by the investigator. This asymmetry is not a minor caveat: it is the reason the ethics of stopping are so much heavier in medicine than in mathematics, and it generates the second of the two symmetrical errors described in XI.5. That the metaphor specifies these boundaries satisfy (iv).

Parable Rather than Ornament

One further observation, which I offer as an intuition rather than an argument. A metaphor is normally something we construct: we notice a resemblance and put it to work. What is described here was not constructed. The structure was in the object before anyone arrived, and our arrival consisted precisely in learning that we could not arrive. The circle is the first figure the human hand produces; the human race spent two and a half millennia discovering that this simplest of forms harbours a quantity finite construction cannot reach — and then proved that it cannot, so that the limit now belongs among the things we know rather than among the things we suspect.

Whether one reads that as a parable embedded in creation or as a fact about the relation between finite procedures and infinite objects is a question the framework itself declines to settle, appropriately, since its whole content is that certain questions are inhabited rather than closed. But the reader should notice that a metaphor one *finds* has a different epistemic standing from a metaphor one *makes*. I have attempted a comparable bridge once before, between the Zoharic and Hasidic doctrine of Shabbat as “beyond time” and the relativistic physics of time, and the methodological caution required there applies here: the formal science supplies an analogue, not a proof, and the analogy must be declared as such [72] (Figure 18).

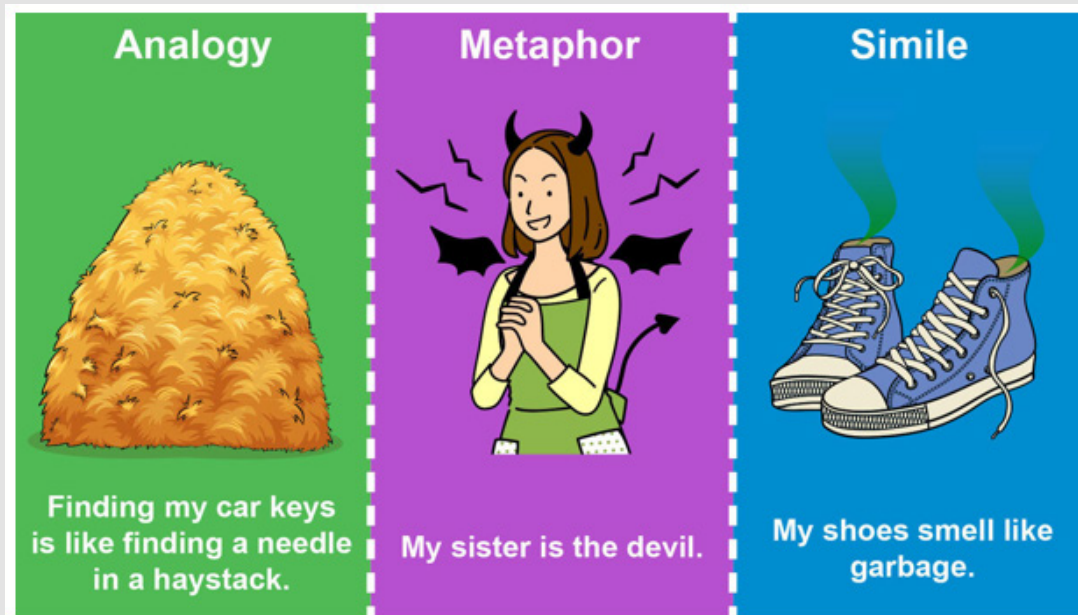


Figure 18.

The Objection, Stated as Strongly as I can make it

Before proceeding I must confront the criticism that will occur to any mathematically literate reader, because the essay is worthless if it cannot survive it. I state it in its strongest form. π is not open, unfinished, indeterminate, or free in any sense whatever. It is among the most rigidly determined objects in the universe of discourse. Every digit of its expansion was fixed before anyone computed it and could not have been otherwise; the ten-trillionth digit is not awaiting a decision. There is no becoming in π and no possibility in π . Indeed, π is a peculiarly bad emblem of freedom, being the very type of necessity: not merely true but necessarily true, fixed in every possible world. Worse, the non-terminating expansion is an artefact of representation, not a feature of the number: π fails to terminate in base ten. One-third fails to terminate in base ten and terminates immediately in base three. And π has closed forms of great elegance — it is the exact value of a definite integral, the exact sum of several infinite series, the exact ratio of circumference to diameter. To say “ π never finishes” is roughly to say “ π is inconvenient to write down in one particular notation.” Building a philosophy of medicine on that is building on a typographical accident. I accept every part of this objection. It is correct, and any version of the argument requiring its denial should be abandoned. But notice what it does not touch. The objection establishes that the indeterminacy is not in the object. Quite so — it never was.

What Archimedes' polygons, Cusanus's angles, and Lindemann's theorem describe is the structure of *access*: the relation between a finite constructive procedure and an object entirely determinate. π is completely real and completely fixed. What is unfinished is not π but the approach to π . The interval is not a property of the number; it is a property of the *relation between a finite knower and an exhaustively real object*. And that is precisely and without weakening the situation of the physician before the patient. The patient is not vague. The patient is not a cloud of possibility awaiting the clinician's constitution. The patient is a fully actual human being with a fully determinate

history, physiology, and inner life — more determinate, more densely real, than any description I shall ever produce. The indeterminacy lies entirely on my side of the encounter. My chart is the polygon. The person is the circle. When I say the patient exceeds the diagnosis, I am not making a mystical claim about the patient's ontological open-endedness. I am making a sober claim about the relation between a finite descriptive apparatus and a reality more determinate than the apparatus can register.

This correction improves the argument in three ways. It rules out relativism. If the object is fully determinate, approximations are ranked by fidelity to it, and some are simply better than others. The physician who takes a careful history is closer to the truth than one who does not, exactly as the 96-gon is closer than the hexagon. Nothing here supports the notion that the patient's reality is constructed by the encounter or that all narratives are equally valid — a position sometimes attributed to the medical humanities and which I want no part of. It relocates freedom correctly. Freedom cannot be a property of π , and the argument should never have claimed it was. Freedom is a property of the *knower in the interval* — of the agent who must act on an approximation, who could always gather another digit, who at some point must stop, and whose stopping is a decision for which he is answerable. There is no freedom in the circle. There is a great deal of it in the decision to double the sides again, or not. It explains why the interval is ethically charged rather than merely epistemically irritating. If the object were indeterminate, the shortfall of my description would be nobody's fault; there would be nothing there to have got right. Because the object is fully real, every premature termination is a failure with a victim. The remainder is not a fog. It is a person. I therefore revise the framing. The claim is not that reality is unfinished. The claim is that *our relation to reality is unfinished, permanently and by proof, and that the space of that unfinishedness is where we act, err, repair, and are held answerable*. That is a thinner claim than the mathematics is often made to carry. It is also the only one it can support, and it is entirely sufficient for what follows (Figure 19).

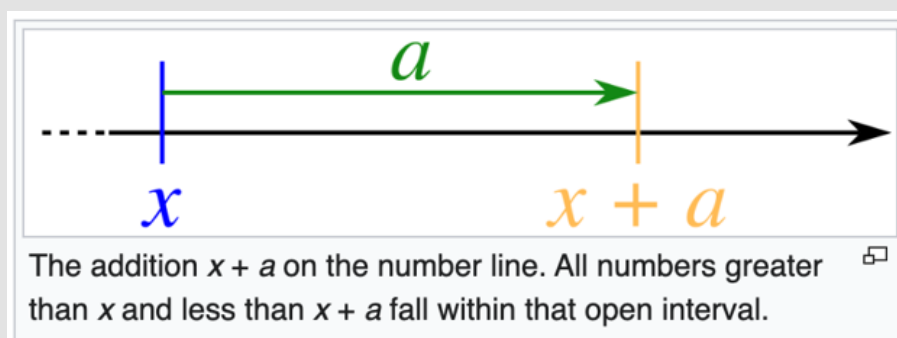


Figure 19.

Freedom as the Inhabitation of the Interval

We can now say what free will has to do with any of this, in a form that does not depend on numerological enthusiasm. The classical Jewish problem of freedom is the antinomy between divine foreknowledge and human choice, and Maimonides' treatment in Hilkhot Teshuvah is instructive not for its solution but for its refusal of one [73]. He affirms both terms — God knows, and man is free — and then declines to reconcile them, on the ground that divine knowledge is not a species of the genus to which our knowing belongs, so that we lack the very concepts in which a reconciliation could be framed. Hasdai Crescas, unwilling to leave the antinomy standing, pressed toward a determinism preserving coherence at the cost of the freedom [74]. The tradition has largely preferred the Maimonidean posture [75], and I suggest this preference is not intellectual cowardice but a substantive position: some structures are inhabited rather than solved, and the inhabiting is where the moral life happens.

The Lurianic material supplies a complementary account. If *tzimtzum* is the withdrawal that makes room, freedom is not primarily a psychological faculty but a *topological* fact: there is a vacancy; it is not filled; what happens in it is not determined by its edges. *Tikkun* names the human vocation within that vacancy — the raising of sparks, act by act, in a labour genuinely cumulative and completed by no generation. The structure is asymptotic in exactly Cusanus's sense: every act is real, no act is final, and both hold at once. This yields a definition neither libertarian nor deflationary: Freedom is the capacity of a finite agent to act within an interval that will not close, where the action is genuinely efficacious, genuinely non-final, and genuine-

ly unforced by the conditions at its boundaries. Three features earn their keep. *It requires the non-closure.* An agent facing a fully specified situation, with a determinate optimum and complete information, is not deliberating; he is computing. Deliberation is the characteristic activity of a knower whose information is a polygon. The interval is not an obstacle to free action but its medium. Remove it and you do not get better decisions you get no decisions, only outputs. This is worth saying plainly in an era when clinical decision support increasingly presents itself as the elimination of the interval rather than as another term in the expansion. *It requires the reality of the object.* An agent acting into a void, where nothing is determinately so, is not free either; he is merely arbitrary.

Freedom without purchase on a real object is not freedom but noise. This is also why the clinical question of patient freedom — in adherence, in addition, in the bounds of choice under illness — cannot be settled either by a naïve voluntarism or by a neurobiological determinism, and why the decision-making models we teach are impoverished by omitting the dimension altogether [76]. This is why the correction of Section IX matters: the patient's full determinacy is what makes the physician's discretion serious. *It requires efficacy without terminality.* This is the structure of *tikkun*, and of every real clinical relationship. What I do today changes the situation and does not finish it. Tomorrow's encounter begins from a genuinely different place and is no nearer the end. Free will, on this account, is participation in the interval between approximation and completion — provided we are clear that the incompleteness lies on our side of the relation. Reality does not need us to be real. The relation to reality does need us; it is never finished; and that is where we live (Figure 20).

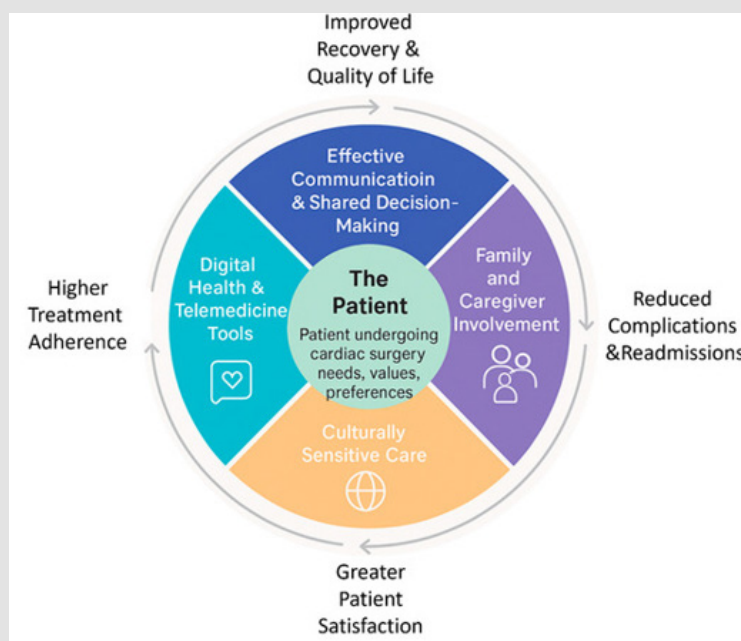


Figure 20.

The Clinical Interval

Everything above has been preparation for this, because the clinical encounter is where the structure stops being interesting and starts costing people something.

Diagnosis as Legislated Rounding

A diagnosis is a *shiur*: a stipulated stopping-point drawn across a continuous and inexhaustible so that action becomes possible. This is not a criticism. Nothing can be done without it. A physician who refused to name anything until he could name everything would never treat anyone, and there is no virtue in that; the halakhic willingness to legislate three is the right instinct. The alternative to rounding is not precision. The alternative to rounding is paralysis. But the diagnosis is three, and the patient is π . The gap is not the failure of a particular clinician. It is structural, permanent, and — in its mathematical analogue — provable. What varies between clinicians is not whether the gap exists, but what they do with it. Peabody's century-old formulation stands unimproved: the secret of the care of the patient is in caring for the patient [77], which is a claim about the interval, not about the diagnosis [78-80]. Consider what the descriptive apparatus systematically discards. The confidence interval reports the precision of an estimate about a population and says nothing about the individual before me. The number needed to treat tells me that among a hundred patients like this one some number will benefit and gives me no means of knowing whether this is one of them [81].

The staging system compresses a biography into a Roman numeral. The criterion set converts an ocean of suffering into a count of five items out of nine. Each conversion is defensible; each is a rounding; and the aggregate of many defensible roundings is a document bearing roughly the relation to the person that 3 bears to π — correct to the first significant figure, wrong in everything after, and adequate for most purposes precisely because most purposes are coarse. The tension is not new to evidence-based medicine, whose founding statement was careful to define the practice as the integration of best external evidence with individual clinical expertise and patient values [82]. What has happened since is a drift in which the first term expanded and the others contracted. Kravitz and colleagues put the difficulty precisely in the language of heterogeneity of treatment effects: the average effect estimated in a trial may describe no individual patient in it [83]. Greenhalgh and colleagues went further, arguing that the movement itself had reached a crisis in which the volume and inflexibility of rules had begun to displace the judgment they were meant to inform [84]. In the vocabulary of this essay: the *shiur* was mistaken for the measurement, and a magnificent instrument for narrowing the interval was misread as an instrument for closing it [18].

The Consultation as Decimal Expansion

If the diagnosis is the first significant figure, the ongoing relationship is the expansion.

The image is more exact than it first appears. Each encounter adds a digit: something not known becomes known, and the interval narrows. The narrowing is real — this is the anti-relativist point of Section IX — and it is ordered: the physician of twenty years' acquaintance genuinely knows more than the physician of twenty minutes. Yet no encounter is the last, and no accumulation converges on the person. The expansion does not terminate, and its non-termination is not a comment on anyone's diligence. This is why continuity of care is an epistemic matter and not an administrative preference. A fragmented system does not merely inconvenience the patient; it repeatedly resets the expansion to three. Every new provider begins at the first significant figure.

The digits accumulated across years of relationship are largely non-transferable, because what the chart holds is the polygon and what the relationship holds is the labour of adding sides. A note records conclusions; it does not record the thousands of small calibrations by which a clinician learned how this person reports pain, or minimizes, or goes quiet when frightened. Balint's observation that the physician himself is the most frequently prescribed drug in general practice belongs here, and it is not sentimental [81]. What Balint identified was that the therapeutic agent in a great many consultations is the relation itself — the interval, inhabited well. The relation is not the packaging around the intervention. In much of medicine, and in nearly all the medicine concerning chronic illness, it is the intervention [58,85].

Premature closure as the characteristic iatrogenic sin

If the structure is an unfinished expansion, the specific harm this framework illuminates are *terminating the expansion early and mistaking the termination for an arrival*. The cognitive literature names this premature closure and pairs it with anchoring: the first plausible hypothesis becomes the frame, subsequent data are assimilated to it, and the process stops before the object is reached [86]. Graber and colleagues found cognitive factors of this kind implicated in the majority of diagnostic errors in internal medicine, usually in combination with system factors rather than instead of them [87]; the Institute of Medicine's report placed diagnostic error at the centre of patient safety and estimated that most people will experience at least one meaningful diagnostic error in their lifetime [88]. Every clinician has done this. Every clinician will do it again. What this essay adds is an account of *why it is so seductive*. It is the specifically human refusal of the interval. We want the number to terminate. We want shalem. The cognitive bias is the epistemic form of a metaphysical appetite, and this is why debiasing strategies aimed purely at technique have had modest results: the target is not a habit but a hunger.

The label is the sharpest instance. A diagnostic label is a terminating decimal applied to a non-terminating person, and once applied it exerts enormous force. The patient labelled with a functional disorder, a personality disorder, a substance use disorder, or medically unexplained symptoms does not merely receive a description; he re-

ceives a *stopping rule*. Subsequent presentations are read through it. Digits that would have been collected are not collected. This is how the neurologist misses the tumour in the patient with a psychiatric history — and it is not principally a failure of knowledge. It is a failure of willingness to keep expanding. The error is rarely one of information; it is one of context, of intuition prematurely overridden, and of a dualism inherited from Descartes that licenses the physician to treat the body as separable from the person whose body it is [89-92]. Here Levinas earns his place. Comprehension, for him, is the structure of totality, and totality is violence: the reduction of the other to a term within my system [53]. The diagnostic label at its worst is exactly this.

The patient becomes an instance of my category; the category is closed; the person's remainder has nowhere to go. Montgomery's ac-

count of clinical judgment as *phronesis* rather than science points in the same direction from within the profession [93]: the competence at issue is practical wisdom exercised under irreducible uncertainty, not the application of a rule to a case. Gadamer's late essays on medicine make the corresponding point about the object rather than the method. Health, he argued, is peculiar in that it does not present itself for measurement; it is the condition of unobtrusive well-being that withdraws from notice, and which we can only approach through its disturbances [94]. The physician's object is thus constitutively one that does not appear directly in the instruments — an enigma in the strict sense, which is what his title asserts. A discipline whose central concept resists measurement should be expected to produce a great many *shiurim* and should expect to be tempted to forget that it has done so (Figure 21).

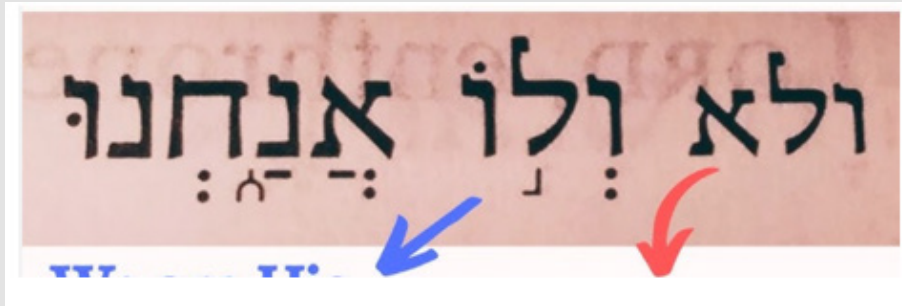


Figure 21.

Where the Surplus Lives

Return for a moment to the *ketiv/qere*. The correction factor was in the gap between what is written and what is read. This is a precise description of a clinical encounter. There is what is written — the chart, the referral, the imaging report, the problem list, the medication reconciliation. And there is what is read — what is said in the room, what is said around the thing that is meant, the pause before the answer, the family member who answers for the patient, the thing mentioned with a hand on the doorknob as the visit ends. The two do not coincide, and the surplus that matters clinically almost always lives in the difference between them. Two pieces of empirical work anchor this. Beckman and Frankel found that physicians interrupted patients' opening statements within a median of eighteen seconds, and that once interrupted patients rarely returned to complete the agenda they had come with [95]. White, Levinson, and Roter documented the closing moments of the visit and found new problems raised at the very end in a substantial minority of consultations [96] — the "oh, by the way" phenomenon that every practitioner recognizes. The doorknob complaint deserves its status as the paradigm case.

The patient has spent the visit on the presenting problem, the physician has completed his rounding, the encounter is formally concluded, and then the real thing is said. What that moment reveals are

that the visit's official terminus and its actual content were never the same event. The visit ended where the *shiur* said it ended. The person did not. Charon's programme of narrative medicine can be read, in the terms of this essay, as a systematic attempt to widen the aperture through which the *qere* — the received, spoken, lived text — can enter the record at all [97]. Cassell's argument that suffering is a state of the person and not of the body makes the ontological version of the same point: the object of clinical attention is not coextensive with the object of clinical measurement [5,98]. The practical discipline I have proposed for widening that aperture is what I have called sacred listening: an attention trained on what is said around the thing that is meant [99].

Two Symmetrical Errors, and why they are the Same Error

I said in Section VIII that a good metaphor specifies where it breaks. Here is the most consequential break, and it generates the second half of the clinical picture. Mathematics has no deadline; medicine has nothing but deadlines. Archimedes could always compute one more digit. The clinician must act on the digits in hand, in the time available, and frequently the ethical failure runs in the *opposite* direction from premature closure. The physician who orders the further test, the additional consultation, the next imaging study, in pursuit of a certainty that will not arrive while the patient's window for

treatment closes, is not being careful. He is refusing the interval just as surely as the anchoring diagnostician, and by the same mechanism: an intolerance of acting without closure. Bradford Hill’s warning that all scientific work is incomplete and liable to be overturned, and that this confers no freedom to ignore the knowledge we already have or to postpone the action it appears to demand, remains the cleanest statement of the duty [100]. So, there are two pathologies, and they are mirror images:

(Figure 22) The last row is the point. They have the same driver. This is why they so often occur in the same clinician, in different domains, and why teaching them as unrelated biases misses their com-

mon root. Both are refusals of the *shiur* as *shiur*: one pretends the stopping-point was a discovery, the other refuses to make one. The virtue at issue is therefore not “never stop expanding.” It is the harder thing: stopping, in full knowledge that stopping is a decision, and remaining answerable for where one stopped. Which returns us to the tradition’s frank legislation of three — a stopping-point declared as a stopping-point, never confused with the thing itself. The clinical translation is unglamorous and entirely teachable: say out loud, in the note and to the patient, what you have concluded, what you have not established, what would change your mind, and when you will look again.

	Premature closure	Compulsive expansion
Error	Stops expanding and calls it arrival	Refuses to stop until arrival
Assumption	The interval has closed	The interval can be closed
Harm	Missed and delayed diagnosis, labelling, dismissal	Delay, cost, overdiagnosis, procedural harm, patient burden
Emotional driver	Intolerance of uncertainty	Intolerance of uncertainty

Figure 22.

The End of the Expansion

There is a final clinical instance where the structure changes character, and it is the one I find most difficult to write about. In palliative care, the expansion stops. Not because the interval has closed — it has not and will not — but because the patient is dying and the further digits will not be gathered. Everything true of the person that never entered the record will remain outside it permanently. The remainder is not going to be recovered. I want to resist the consoling formulation. The temptation is to say that at the end, in the intimacy of dying, we finally arrive at the person; that the last conversation closes the gap. It does not. What happens, in my experience, is that the gap becomes visible and stops being a problem. The work of expansion ends and what remains is presence in an interval both parties now know will not close. That is not a lesser thing than knowledge. It may be the only relation to another person fully honest about its own

terms. Saunders’ insistence that the dying patient’s need is not for the closure of the medical question but for the continuation of attention after the medical question has closed describes the same reorientation from within the discipline she founded [101]; Frank’s account of illness narratives that refuse restitution and resolution describes it from the patient’s side [102].

I have argued the theological version of this at length — that end-of-life care requires a posture of being-with-nonbeing rather than a strategy of resolution, that the terminal utterance carries a weight no chart records, and that the mortality awareness clinicians avoid naming is precisely what the dying patient most needs named [103-105]; the question is one I first took up nearly four decades ago in relation to hospice and Jewish values [106]. The Lurianic vocabulary is unexpectedly exact here. The vessel breaks. It was always going to break; no vessel was ever adequate to the light it held. What re-

mains is neither the vessel nor the light but the sparks — the specific, scattered, recoverable fragments a particular relationship generated, which outlast it. The physician's tikkun is not the repair of the patient,

which is not on offer. It is the raising of whatever sparks the encounter produced, in a labour that is real, cumulative, and completed by no one [48,107-117] (Figure 23).

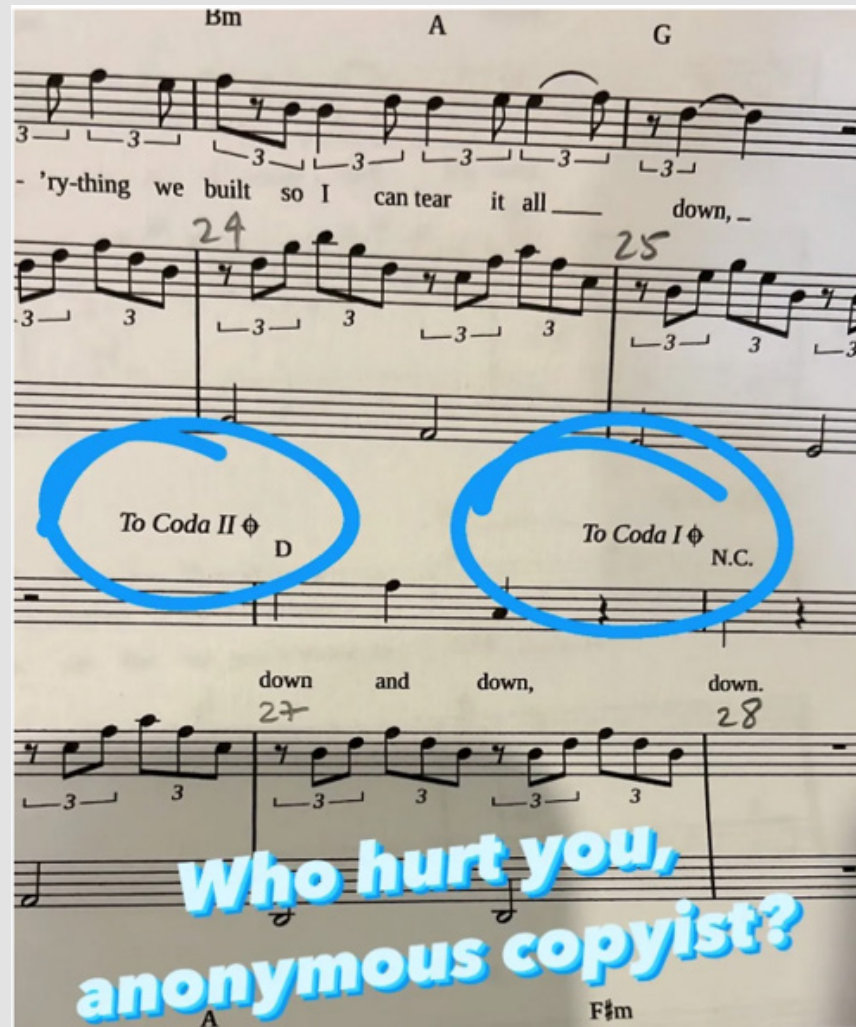


Figure 23.

Coda: Three, and what Comes After it

The world gives us three. Three is not false. It is the first faithful digit, and law, medicine, and ordinary life are built on it and could not be built otherwise. The molten sea was cast with it. Every guideline in every specialty is a more elaborate version of it. To disdain the approximation because it is an approximation is not sophistication but a failure to understand what approximations are for. But three is not the ratio, and no finite sequence of digits is, and the distance between

what we can write and what is there is not a defect in our instruments. It is the room we were given to work in. The physician does not possess the patient. He approximates; the approximation is genuine; it improves; it does not finish. Every consultation is another decimal place. The patient always exceeds the diagnosis — not because the patient is vague, but because the patient is more real than the description and always will be. That excess is not the failure of medicine. It is its subject matter, its permanent obligation, and the only place where anything a physician does could possibly be free.

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