REFACTOR

Purity, Prestige, and Pettiness

How pure mathematicians turn taste into rank

Henry Shin · 9 November 2026

An opening essay for a collection of 109 works on mathematical snobbery, computation and institutional authority.

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Hardy opens *A Mathematician's Apology* by assigning exposition, criticism and appreciation to second-rate minds. He includes himself in the judgment. A few pages later, he allows professors a little exaggeration of both their subject's importance and their own, while warning against excess. The hierarchy and its salesmanship arrive together. Explaining mathematics is marked down, while promoting one's place in it receives an indulgence. A subject proud of exactness can be remarkably accommodating toward its own prestige. [20]

The habit appears on smaller stages. Karp's unnamed seminar speaker turns a question about a bag into a lesson in mathematical precision. An ordinary meaning becomes an opportunity to establish who gets to correct whom. The exchange shifts from handing over a bag to defending an ordinary expression. [55]

Rota's verdict on mathematicians was blunt. “They're snobs.” The substantive charge is sharper than the insult. A difference in vocabulary becomes an occasion to put someone in their place. A preference for one sort of problem becomes a judgment of another person's seriousness. The dismissive word is cheap to utter and expensive to answer. Its speaker acquires the appearance of discernment, while the burden of doing the discerning work falls elsewhere. [17]

Pure mathematics gives this arrangement an impressive shelter. A valid proof establishes its conclusion independently of the author's standing. Whether a purported proof is valid still has to be checked. Judgments about importance, explanation and intellectual depth require a different kind of justification, through comparison, experience and reasons. When a pure mathematician carries the authority of proof into a verdict of taste, the verdict borrows a certainty it has never earned. Technical brilliance then protects an intellectual shortcut that could not justify a step in a proof.

The stakes rise when the shortcut acquires institutional force. Rota's departmental rules advise keeping low estimates from other departments, praising mathematical colleagues to outsiders and making comparisons of value at tenure decisions. These are explicit instructions for managing professional standing. They expose the difficulty with treating a profession's public agreement as though it simply reported what independent scrutiny had established. The agreement can also be something the profession has learned to produce. [21]

Zeilberger's attack on disciplinary rank and Nathanson's scrutiny of mathematical proof give this essay its bearings. Their work approaches the same question from different sides. Who is expected to supply the argument, and who is allowed to let standing supply it? The question reaches from a humiliating seminar exchange to the judgments that determine which work receives attention. [5] [107]

This is where pettiness becomes a serious intellectual defect. The people who control attention, publication and appointments can make others pay dearly for failing to satisfy a judgment whose grounds remain elusive. Pure mathematicians who demand precision from unfamiliar work owe precision in assessing it. When they instead invoke depth, purity or prestige as sufficient reasons to stop listening, the distinction they are defending is their own exemption from the standards they impose.

I. How taste becomes rank

When purity becomes a title of rank

A mathematical subject can be identified by its objects, methods and questions. Calling it pure can quietly add an honorific. Distance from practical demands becomes a sign of elevation, and accepting those demands begins to look like an intellectual compromise. The resulting hierarchy rewards abstention before asking what was achieved. A researcher can acquire distinction from the problems they have declined to face.

Hardy's *Apology* supplies a canonical version of this vocabulary. His distinction between real and trivial mathematics attaches intellectual rank to kinds of work, while his pride in harmlessness gives remoteness from use a moral attraction. His categories include substantial mathematical physics, and the wartime setting matters. Nevertheless, the book makes it remarkably easy for a reader to inherit contempt for useful work alongside admiration for beautiful mathematics. [20]

Halmos's *Applied Mathematics Is Bad Mathematics* makes the ranking concrete through a portrait by Picasso and a police photograph. He acknowledges the photograph's usefulness, then judges it as art. Applied mathematics receives the corresponding treatment, with respect for its scientific achievements followed by an adverse mathematical verdict. The opening qualifies the title, but the conclusion restores the hierarchy. Success at one demanding task is marked down against the evaluator's preferred task, which retains the encompassing name of mathematics. [19]

This ranking is particularly convenient because a scientific problem imposes demands an internally chosen problem may avoid. The model has to represent something. The answer has to meet an accuracy requirement. The algorithm has to finish with the resources available. Data can be incomplete, a limiting regime singular, an elegant formulation computationally hopeless. These difficulties belong to the intellectual task. Treating them as impurities lets a preferred style win a competition after its awkward requirements have been struck from the rules.

Harvey Cohn recalls teachers preaching mathematical purity while engineering departments supplied subjects he needed. He interpreted the prestige of abstention from applications as an academic class distinction. Volker Runde later challenged the evaluative associations carried by the adjective itself. Paul Ernest's analysis of purism develops the distinction between describing an unmixed activity and praising an untainted one. Together these writings identify how a label for a field can carry an unsolicited judgment of the people outside it. [56] [62] [82]

The insinuation delivers a personal advantage without a corresponding intellectual obligation. Finding a modeling problem dull establishes the critic's lack of interest. It leaves the difficulty, originality and importance of the modeling untouched. Those questions require acquaintance with the work. Purity becomes a status device when it supplies the social benefit of a verdict while excusing the inquiry needed to support it.

Zeilberger's reply to Halmos puts the objection squarely. Mathematical labels give one group no entitlement to look down on another. His sustained criticism of that hierarchy is central to this collection. The unity of mathematics cannot sensibly be celebrated when an application validates a

favorite theory, then forgotten when the people doing the application ask for equal intellectual consideration. A discipline that advertises its eventual usefulness has accepted an obligation to understand the labor by which usefulness is actually obtained. [5]

The complaint reaches well beyond one numerical school. Dantzig rejects the supposed gulf between pure and applied work. A memorial account of Bellman recalls hostility to his attacks on mathematical elitism. Kung describes Rota's alignment with applied mathematics as an escape from pure-mathematical pettiness. These are different witnesses and different kinds of testimony. They identify a grievance with a long professional history, rather than leaving the reader with one isolated quarrel. Once a difference of subject has become a difference of rank, even an ordinary conversation can be used to enforce it. [12] [54] [10]

Precision performed at someone else's expense

Dagan Karp describes a revealing encounter with a seminar speaker. Offering a bag, he asks, “Is this you?” The speaker replies, “No, but it’s my backpack,” then invokes mathematicians' precision after Karp objects. Karp does not identify the speaker's specialty. His criticism concerns a mathematical mannerism, obstructing an ordinary meaning and making the questioner absorb a correction. [55]

Nathanson describes requests for detail in seminars meeting assertions of obviousness or a look that makes the questioner feel stupid. He contrasts these responses with Gel'fand's simple questions and elementary examples. The useful interruption makes an argument easier to inspect. The intimidating reply makes inspection harder. [108]

A technical conversation permits a more costly version of the same performance. The polemical introduction by Hassani, Maillard and Zenine depicts physicists seeking representations and examples, only to encounter terminological rebukes or examples of little use to their inquiry. Against these stylized encounters, Maillard recalls Jean-Louis Verdier explaining through concrete objects. The contrast makes the demand precise. An explanation should equip the questioner to proceed, rather than merely exhibit the respondent's command of the language. [11]

Consider the chosen point in the definition of an elliptic curve. A careful mathematician can explain which construction requires it, whether the object under discussion already comes with one, and what changes when a choice is made. That explanation may transform a confused conversation into a productive one. Merely announcing that the physicist has no right to use the term leaves almost all the intellectual work untouched. The distinction is real. The grandstanding consists in extracting a status victory from it while withholding its use.

Definitions and hypotheses matter. That truth gives the performance its cover. A correction can locate a fatal error, expose an ambiguity or make a construction usable. It can also spend everyone's time establishing that one participant knows how to correct another. The difference appears in what the intervention enables. A culture that excuses every obstruction in the name of rigor has stopped examining the use to which rigor is being put.

Rota's departmental rules explicitly rebuke the belittling of elementary mathematics and good teachers. His reflections on differential equations recall colleagues saying they would rather resign than teach the sophomore course. He also found the conventional course unsatisfactory, so the aversion alone cannot

establish contempt for students. The separate injunction to respect teaching is unequivocal. A profession that depends on learners has reasons to value the people capable of reaching them. [21] [23]

Explaining a basic construction to someone who lacks the vocabulary can demand a clearer command of it than repeating the definition among initiates. Choosing an example that exposes the obstruction requires judgment about what the listener needs to see. Refusing that task while ostentatiously advertising one's sophistication is an especially shabby way to claim superiority over a teacher.

The dispute over practical textbooks exposes the same habit. Seymour Lipschutz's defense of affordable Schaum's volumes quotes Rota against contempt for their readers. Lipschutz had an interest in the series and disclosed it. His intervention nevertheless raises a question that prestige alone cannot answer. What helps a student acquire the skill? A textbook's position in an academic hierarchy and its success in teaching a subject are different things to investigate. [76]

Calling it trivial before doing the work

Declaring another person's result an immediate consequence of something classical is an unusually efficient claim to superiority. The critic displays breadth, speed and perspective in a sentence. The presenter must then interrupt the argument to reconstruct a comparison the critic may barely have begun. By the time the hypotheses have been sorted out, the audience may already have registered the verdict.

Zeilberger's Opinion 29 examines a premature dismissal of his own. He identified Bass's result with a familiar theorem and received an admiring response. The hypotheses differed, and establishing the relationship took two summers with Dominique Foata. He also recounts a dismissal by Gene Golub that overlooked the distinction between numerical and closed-form answers. He chose to make the mistake and the correction public. [33]

His willingness to examine his own part gives the account its force. A proposed connection can receive the social reward of an accomplished reduction while its mathematical justification remains undone. The lesson is exacting. A profession that carefully distinguishes a conjecture from a theorem should recognize the same difference when the conjecture flatters the critic. Publishing the correction is part of meeting that standard.

Mathematical reduction has a content. The assumptions must match or be bridged. The objects must be translated. Exceptional cases must be handled. If the claim concerns an algorithm, the translation must preserve the relevant resource bound. If it concerns a numerical procedure, stability and accuracy may survive badly or fail altogether. Saying that two things are essentially the same supplies none of this automatically.

Rota recalls a number theorist dismissing Erdős's work as reliance on a few tricks. His response is that even admired theorists repeatedly use a limited repertoire. The dismissive description selects a feature that can be found throughout successful mathematics, then makes it degrading when applied to the wrong person or subject. The issue is the asymmetry of interpretation. One mathematician possesses a powerful method. Another merely has a trick. [22]

A trick can certainly be narrow. So can a theory. The useful question is how far the idea travels, what it makes possible, and which obstructions it reveals. A method stated informally may organize many

arguments. A formally elaborate framework may yield little beyond its defining examples. To compare them responsibly requires attention to their actual reach. The hierarchy of vocabulary makes that comparison disappear by announcing its result in advance.

Nathanson identifies a related perversity. A theorem wins admiration with a difficult proof, and a later author wins admiration for simplifying it. Had the short proof appeared first, the result might have been dismissed as easy. He values proofs whose steps are easier to check. The status judgment can reward the obstacle that clarification removes. [108]

An elementary argument earns its force by retaining the original constraints while making a decisive operation available. Calling it obvious requires an account of where that operation was already available and how it answered the same question. Familiarity with the finished argument supplies no such account. The critic who refuses to give one is asking confidence to be accepted in place of the reduction. The comparison of two Cauchy–Schwarz proofs gives a concrete test of what a different account lets a reader calculate.

Grothendieck takes up an observation that Ronnie Brown attributed to his teacher J. H. C. Whitehead, that a theorem need not be trivial because its proof is easy. He then attacks a more consequential use of obviousness, dismissing ideas as trivial while obstructing their publication. The charge is his, recorded in a polemical memoir. It identifies a particularly vicious possibility. A contribution can be declared too obvious to deserve attention while its author is denied the chance to make that obviousness available to others. [30]

The recurring maneuver transfers the work of judgment to its target. The dismissed researcher must explain the distinction, supply the missing comparison and repair the audience's impression. The same transfer becomes easier still when an entire form of inquiry can be bundled into a depreciatory phrase.

II. The work the ranking conceals

What the dismissal of computation leaves out

“Mere computation” is one of the most economical insults in the repertoire. It can sweep pressing a button, inventing an algorithm, finding a representation, proving convergence, controlling error and building a reliable implementation into one supposedly inferior activity. The speaker sounds discerning because the description has deleted everything that would require discernment.

Hamming's *Numerical Analysis vs. Mathematics* belongs to an older argument over the standards by which numerical work should be evaluated. Trefethen's later essay on the definition of numerical analysis makes the problem concrete. He argues that treating the field chiefly as the study of rounding error obscures its central concern with algorithms for continuous problems. Questions of approximation and speed would remain even in a world of exact arithmetic. [4] [93]

Existence, convergence and feasible calculation answer different questions. A convergent sequence may approach its limit at a useless rate. A finite algorithm may demand more resources than can be supplied. Two algebraically equivalent expressions may give radically different answers on a finite-precision

machine. Treating the existence theorem as the intellectual achievement and the remaining questions as routine execution assumes away the very obstacles the numerical analyst has to resolve.

Even a tiny example makes the distinction visible. For a small positive x, the expressions $\sqrt{(1 + x^2)} - 1$ and $x^2/(\sqrt{(1 + x^2)} + 1)$ are equal in exact arithmetic. In standard binary64 arithmetic at $x = 10^{-8}$, evaluating the first by its displayed operations can give zero, while the second gives approximately 5×10^{-17}. Rationalizing the expression changes the reliability of the calculation. The algebra matters because of what it enables on the machine.

The scientific question adds further constraints. What accuracy is warranted by the data? Which features must survive discretization? Where does sensitivity make a precise-looking answer misleading? Which check could reveal that the model itself is wrong? A culture that ranks these questions beneath the manipulation of an exact formula has confused its preferred setting with a measure of intellectual difficulty.

If a contribution receives respect only after its practical purpose has been removed from the story, the ranking has distorted the account of the work. An accuracy requirement, awkward data or a computational obstruction may have forced the useful idea. Strip those away and the final theorem can appear to have arisen in a cleaner, more prestigious setting. What disappears is the account of how the achievement became possible, including the people who made it usable.

Trefethen recalls pressure to advance through prestigious courses while ordinary linear algebra seemed beneath a serious student. He first encountered eigenvalues in physics. The hierarchy had made a basic and useful idea easier to miss. Corless's review connects disdain for practical work with disdain for craft, then turns the criticism toward numerical communities' own neglect of symbolic computation. The appetite for rank can reproduce at the next boundary. [2] [3]

Such a hierarchy can recruit the people it injures. When respectability depends on resembling those who grant it, a group has an incentive to repeat their distinctions at its own boundary. Whether a method solves a problem well can become secondary to whether it looks like the approved kind of mathematics. This is an institutional pressure toward conformity, even without a common intention to conform.

The intellectual work that gets called craft

The division between ideas and execution assigns the most flattering description to the person who stops first. One researcher proposes a formulation. Another discovers that it cannot be implemented as stated, repairs it, checks the exceptional regimes and makes it useful. Calling the first contribution creative and the rest mere craft settles the credit before inspecting what either person had to invent.

Kahan's oral history supplies a practical reason to reject the ranking. He describes the work of carrying geometric and combinatorial understanding into the linear language a computer can execute. That translation requires mathematical decisions, and he insists that programs should be written so their behavior can be reasoned about. His condemnation of pure mathematicians who look down on applied colleagues belongs beside that account of what the work requires. [61]

In his reconstructed conversation with Ulf Persson, Hersh attributes disdain for numerical analysis to a desire for status above engineering. Lax's interview attacks the assumption that applied mathematics is inherently ugly. The first gives a participant's explanation of the snobbery, the second disputes its

aesthetic premise. Closeness to use can generate the difficult questions the hierarchy treats as evidence of lower standing. [46] [47]

A failure near a singular regime may call for a new formulation, an asymptotic argument, an invariant, a different discretization or the recognition that the model has ceased to be trustworthy. Choosing among those explanations is conceptual work. A blackboard does not make symbol manipulation thoughtful, and a keyboard does not make it mechanical. The distinction has to be found in the reasoning.

Dijkstra's famous reversal assigns weaker mathematicians to pure work and calls demanding programming applied mathematics. The insulting symmetry exposes the convenience of the original ranking. It supplies flattering language to a different group while leaving the actual comparison to be made. The inversion has polemical force because the hierarchy is so familiar. It still owes evidence wherever it claims more than that. [87]

Implementation can force an idea to disclose its debts. An unstated choice has to be made. A supposedly available operation turns out to be impossible. A hidden dependency becomes a failure on an actual input. Testing can reveal a regime the derivation ignored, and maintenance can demand distinctions that a successful demonstration concealed. The intellectual content resides in those discoveries and repairs, even when the resulting artifact occupies an unfashionable place in academic accounting.

Wolfram's interviews attack the exclusion of computation and the failure to recognize system design as intellectual work. His position as a creator of computational systems gives him a direct stake in that recognition. The dispute still demands an answer about the work itself. Which ideas does the system embody, which tasks become possible, and what would be lost if its design were treated as a service performed after the thinking was over? [91] [92]

Zeilberger argues that programming can itself produce insight. Wilf gives mathematical experimentation a route from computed examples to a conjecture that still needs proof, including a correspondence suggested by comparing counts of matrices and directed graphs. In both, computation changes what the researcher can notice and ask. Its contribution begins before a final theorem can be detached and presented in a prestigious form. [34] [50]

Zeilberger's criticism also has a constructive counterpart. In his Steele Prize response, he describes the collaboration with Wilf that produced WZ theory and the possibilities of human-computer cooperation. *Computerized Deconstruction* accompanies its argument with five Maple packages. These contributions put the dispute about mathematical value on practical ground. Methods, implementations and reusable procedures give others something to examine and use, regardless of where a hierarchy would place them. [44] [45]

Where a critic recognizes abstraction in a theorem but refuses to look for it in code, the prestige of abstraction has become detached from its intellectual purpose. The question is which relations the program preserves, which choices it makes explicit and what reasoning it enables. Dismissing the artifact before examining those features replaces a judgment of the work with a judgment of its category.

Abstraction and the debts it forgets

Abstraction earns its power by carrying useful features across problems. Prestige can reverse that relation, making the abstract appearance of a description stand in for an account of what it accomplishes. A category may organize a construction or decorate it. A theorem may open a route to calculation or leave the decisive difficulty untouched. Establishing which has happened requires the very acquaintance with the problem that an appeal to generality can be used to avoid.

Von Neumann warns that remoteness from empirical sources can leave a subject proliferating into insignificant complexity. Mumford's 2006 essay argues for exchange between abstract and concrete work. The published abstract of his 2012 address is blunter about the pecking order that puts the most abstract pure mathematics on top. These are different formulations of a challenge to ranking work by the degree of its internal elaboration. [48] [51] [52]

A theory's polished presentation can conceal its own discovery. A physical problem supplied an object, an experiment suggested a phenomenon, a numerical example revealed an obstruction, or a practical requirement forced a definition. The mature exposition begins with that definition and makes the earlier work appear dispensable. The reader acquires the finished language and mistakes a dependency no longer visible on the page for a dependency that never existed.

The question is also pedagogical. Arnold's polemics return insistently to students who have acquired sophisticated language while lacking command of concrete geometry and physical examples. Hammersley challenges the authority of pure mathematicians to decide what practical mathematical education requires. Both writers are severe, sometimes extravagant critics. Their examples nevertheless direct attention toward a testable educational failure, the ability to reproduce the language of a subject while being unable to use it on an intelligible problem. [9] [26] [88]

The same reversal makes a poor explanation difficult to challenge. A student asks what the machinery does and is told to learn more machinery. A colleague asks for an example and receives another definition. The promised understanding retreats one prerequisite farther away. Long preparation can be genuinely necessary. Invoking that necessity still leaves the teacher responsible for explaining what the preparation serves.

An explanation should therefore expose its own dependencies. The reader needs to know which object is being built, what operation it permits, why the hypotheses matter and how the result returns to the initial question. Meeting those demands can require very advanced mathematics. Evading them while demanding admiration for the difficulty of the subject is a claim on the reader's deference, with the explanatory work left unpaid.

Rota distinguishes mathematical facts from the axiomatic methods that establish them, while insisting on the indispensability of those methods. He also describes learning from failed attempts as part of solving a problem. A finished presentation can hide that route to discovery. The consequence for judgment is ours to draw. If a profession counts only command of the final language, it can overlook the choices and repairs through which the language acquired its use. The misdescription is ready to become an institutional rule. [24]

III. How the hierarchy reproduces itself

The cost of being hard to place

A dismissive habit acquires a different force when its practitioner controls a position, a budget or a journal. One person's difficulty recognizing a research direction can become another person's inability to obtain time to develop it. The institution then congratulates itself for identifying promise among the careers it helped make possible. Its own contribution to the result has vanished from the explanation.

Mandelbrot recalls an offer of a high university position being withdrawn because his future work was considered unpredictable. He also describes an NSF grant refusal despite five outstanding reviews and one excellent review, followed by an award of half the requested funding after he protested. His account leaves the university and decision-makers unnamed. Its relevance is the reported criterion. Work could receive exceptional praise while the person doing it remained too difficult to classify. [90]

Predictability makes an exceptionally convenient substitute for judgment. A recognizable project arrives with a vocabulary, an audience and an expected succession of results. A new direction may need to create all three. Assessing promise through familiarity can therefore reward resemblance to the committee's past and charge originality for being original. A report of uncertainty about the evaluator's understanding becomes an adverse judgment of the applicant.

Mandelbrot's account of hostility toward mathematical pictures belongs in the same argument. A representation that made phenomena available for investigation could be treated as evidence of intellectual unseriousness. In his interview with Hans Ulrich Obrist, the resistance concerns both visual mathematics and small professional circles writing chiefly for themselves. The issue is who may decide which forms of apprehension count as mathematical work. [89]

A serious objection to a picture identifies what the picture fails to establish. Perhaps the apparent feature depends on resolution, conceals a singularity or disappears under perturbation. Such objections can improve the inquiry. General contempt for pictures exempts the critic from examining whatever they make visible. The badge of sophistication is purchased by narrowing the evidence one is willing to consider.

The Bourbaki interview supplies a more specifically mathematical institutional setting. Senechal's introduction describes an insurgent movement becoming an establishment. Cartier recalls resistance to his mathematical-physics contributions to the seminar and the subject's absence from the books. His account exposes the gap between an influential program's achievements and its capacity to recognize what falls outside them. [25]

A successful program attracts people because it reveals things. Its adherents become dangerous to other work when they treat the program's omissions as a map of what may safely be ignored. Narrowness can then present itself as ambition. A scheme promises to organize mathematics while allowing its authors' competence to determine what mathematics contains. The missing subjects are demoted for having escaped the scheme.

Logic shows how the same practice can exclude another pure specialty. In a 1998 reply concerning his earlier Bourbaki essay, Mathias explicitly challenges the group's elevated authority. His longer 2014

essay opens with the exclusion of formal logic from the French CAPES syllabus and argues that prestigious misconceptions helped sustain its marginalization. That causal argument is Mathias's. The institutional question is concrete. How much ignorance of a subject can be made respectable by the standing of the people who disregard it? [27] [29]

The hierarchy can consequently subdivide without limit. After applications have been pushed down, pure mathematicians can rank one another by abstraction, ancestry, institutional address or proximity to a celebrated program. The exclusion of another pure specialty makes the mechanism especially plain. The privilege being defended is the power to decide where the center lies.

How preference comes to look necessary

Steingart's archival history puts an admission of prejudice inside an organizational dispute. Writing to Synge on 7 November 1946, Householder says pure mathematicians look down on applied colleagues and acknowledges that he had done so himself. The surrounding correspondence complains about the abstract fashion in American Mathematical Society addresses and the influence of abstract interests. Here the attitude is documented alongside a debate over what a professional society should represent. [83]

A funding applicant must write for a panel. A young mathematician needs referees. A department decides which subjects are central enough to teach and whom it will hire to teach them. Every decision may come with a locally plausible defense. Repeated across institutions, those decisions determine which styles become familiar, which have trained advocates and which must explain themselves from the beginning. Inherited preference acquires the appearance of necessity.

Brian Martin describes the institutional advantage of defining mathematical value internally. Work directed toward an external purpose is exposed to evaluation by people concerned with that purpose. A profession claiming exclusive competence to judge its own worth can seek resources while restricting who may assess what those resources achieve. His sociological argument makes the connection between purity and autonomy explicit. [60]

Chang and Fu's genealogy study supplies a different kind of evidence. Their elite network is constructed from paths connecting Fields Medalists, and their analysis concerns concentration and representation under that definition. It leaves the motives of particular evaluators open. Its value for the present argument is the reminder that mathematical eminence has a social structure that can be studied, rather than merely celebrated. [59]

A defense of the hierarchy becomes circular when success is offered as proof that its criteria were right, and dissent as proof that a dissenter deserved to fail. Both judgments depend on the authority they purport to establish. If the assent of beneficiaries counts as confirmation while objections count as evidence of unfitness, the hierarchy has arranged to win every argument before hearing it.

Mathematicians know how to recognize an argument that smuggles its conclusion into an assumption. That competence should survive the walk from the blackboard to the appointments committee. It should also make them suspicious of public agreement when professional loyalty is part of the reason for displaying it.

Rota's departmental advice makes the public management of standing explicit. His 1992 rules tell mathematicians to keep colleagues' low estimates of fields and people from other departments, lest those departments exploit the weakness. They recommend praise to outsiders and place forceful comparisons of relative value in settings such as tenure decisions. This is advice about preserving institutional power. Public solidarity and internal ranking are being cultivated together, so the resulting appearance of agreement cannot simply be treated as independent confirmation of the hierarchy. [21]

What the credit system teaches

Thurston describes being praised for “killing” the field of foliations while prospective entrants were being advised to avoid it. His own retrospective explanation concerns difficult exposition and the pressure to obtain theorem-credit in territory where many results seemed already claimed. The celebrated success and the barrier to entry formed parts of the same situation. His account makes visible what a list of theorems and honors would miss. [18]

Nathanson supplies a concrete example of what this accounting misses. In *Addictive Number Theory*, he reproduces Gowers's account of needing Freiman's theorem but being unable to follow its original proof or assemble Ruzsa's scattered treatment. Nathanson's book supplied the exposition he needed. The retrospective also describes additive number theory's passage from neglect to selective fashionability. Here the work of making an argument accessible enters the chain of research as a productive contribution. [109]

The theorem provides a conveniently identifiable moment of success. Much of what makes it possible has no equally convenient signature. Explanation, examples, notation, software, testing and patient conversation change what other people can do, often through contributions distributed over years. A credit system organized around the final identifiable result will underdescribe that work, even when everybody involved behaves decently.

It can also cultivate a particular kind of indecency. Another person's need for explanation begins to look like an interruption to the serious business of producing theorems. Exposition becomes a concession to weaker minds. Implementation becomes something to delegate. The refusal to perform connective work acquires the appearance of intellectual altitude, and impatience with other people passes for evidence of important things on one's mind.

Bass describes the same asymmetry in mathematics education. Some mathematicians invoke proved theorems and positions at prestigious universities while denying standing to teachers' practical knowledge. Teachers are expected to listen, while their evaluators may feel little obligation to learn from them. His earlier essay supplies a personal counterpoint, recalling how his own formal style frustrated attempts to explain mathematics. Knowing the subject did not automatically give him the ability to communicate it. [57] [58]

A theorem establishes something about the theorem's subject. It gives its author no automatic knowledge of how students learn, how a numerical method fails or what another science requires. Those subjects demand their own observation and inquiry. Treating distinction in one field as an exemption from learning another is intellectual laziness protected by reputation.

Teachers, numerical analysts and programmers are especially exposed to this borrowed authority because the remaining difficulty is so easily described as a lower layer of the work. Yet a method that cannot be implemented, a theorem whose hypotheses cannot be checked or an explanation that reaches no intended reader has left a consequential task unfinished. That task does not become easy at the point where the prestigious contributor loses interest.

The rejection and the reason

Nathanson presses the issue at the profession's most protected point, its claim to certify truth. His 2008 essay describes reliance on small circles of authorities and questions how thoroughly published proofs are checked. He expressly declines to assert gaps in Wiles's or Perelman's work. The target is the passage from another person's assurance to a community's certainty. The authority to declare a result settled becomes especially consequential when it also controls whose request for verification deserves an answer. [107]

Editorial language gives the hierarchy a compact administrative form. A result is too special, insufficiently interesting or unsuitable for the audience. Those assessments require judgment, but their brevity can conceal whether the decisive comparison has been made. The author is asked to accept the verdict while remaining unable to distinguish a mathematical objection from a mismatch of scope or the editor's unfamiliarity with the work.

Zeilberger makes editorial judgment available for scrutiny by publishing the decisions alongside his criticism. Opinions 118 and 121 concern the same project with Andrew Sills on Rademacher's conjecture. The *Mathematics of Computation* report calls the work interesting while objecting to its inconclusiveness. *Experimental Mathematics* invites a revision addressing or removing Conjecture 2.1. Zeilberger declines reconsideration, asks for an explanation of the objection and defends the conjecture's value as a guide to further research. The correspondence exposes a substantive dispute about what experimental evidence and conjecture formation contribute, and what a journal should require of them. [36] [37]

Opinion 153 challenges the discretion concealed by a separate desk rejection for insufficient interest. Zeilberger interprets the decision as hostility toward explicit formulas and computer assistance. The stated reason does not establish that motive. His challenge nevertheless identifies the comparison an adequate assessment would need. How do the editorial criteria apply to this contribution, and how do they compare with the standards applied to work the journal accepts? [41]

The dispute about *Mathematical Reviews* concerns the distribution of explanatory attention. The short computer-associated papers in Zeilberger's complaint received bibliographic listings without full reviews. He argues that compressed papers can especially need explanation. Jane Kister's reply cites limited reviewing resources and distinguishes what a review can add from what a listing already supplies. Their disagreement asks which contributions receive that additional professional attention, and why. [43]

Opinion 112 asks whether scrutiny is distributed consistently between computer-assisted work and conventional proofs. Its examples make that an appropriate question for an editor. Which claim needs checking? Which standard was imposed on comparable work? Was repair possible, or did an unfamiliar

form of contribution become disqualifying? The answers may vindicate a rejection. What professional authority must supply is the comparison, rather than an invitation to trust the professional. [35]

A rejection can be justified without becoming an endless correspondence. A concise account can identify a missing contribution, an unresolved objection or a decisive comparison. Editorial authority becomes petty when it insists that the author accept a judgment while treating a request for its substance as an impertinence. Prestige should improve the quality of the account. Using it to dispense with the account converts esteem into exemption.

Gowers and the limits of revolt within the hierarchy

A hierarchy can survive a revolt against one of its rankings. Gowers's *The Two Cultures of Mathematics* defends problem-solving subjects, especially combinatorics, within pure mathematics. His accompanying explanation accepts the theoreticians' criteria of worthwhile mathematics and argues that combinatorics satisfies them. The challenge concerns who has been admitted under the standard, while the standard retains its jurisdiction. [97] [103]

That leaves the maker of an algorithm, a model or a painstaking computation facing the old demand. The work must become legible to a conception of depth developed around other achievements before it receives full intellectual standing. Admission of an undervalued specialty can correct a ranking while preserving the authority to rank everyone else.

This is a limited form of pluralism. The established audience may enlarge its canon without reconsidering the way it chooses one. What happens to work whose value consists in reliability, explanatory access, usable methods or contact with a scientific problem? Praising a field after discovering that it meets familiar criteria leaves that question open.

The same issue appears in Gowers's public defense of mathematics. His comparison gives the pure problem the attribute “interesting” and the potentially useful problem the attribute “uninteresting.” He also describes the temptation to prefer mathematical elegance to model accuracy. Bruss challenges the criterion directly from the perspective of probability and useful modeling. The apparent neutrality of mathematical interest is exactly what is in dispute. [104] [94]

A private preference becomes a public claim through a quiet change of scale. A researcher finds a problem interesting. An internal audience shares that interest. The audience's response is then offered as a reason for society to support the work. At each step the circle granting the judgment authority has widened, while the reasons may still amount to what one circle likes. The prestige of mathematics makes the substitution easier to overlook.

Steinhardt and Christiano press a related question about the inference from interconnectedness to the practical value of pure research. Their 2011 comments ask what the connections establish about comparative investment and causal dependence. Steinhardt subsequently withdraws a stronger claim about complete disconnection from reality. The remaining question concerns which work most effectively advances the ends being invoked in its defense. [95] [96]

Interconnectedness alone cannot perform that missing comparison. Mathematical connections differ in direction, strength, usefulness and cost. Some become indispensable routes of discovery. Others remain available without carrying much consequential traffic. The existence of a connection leaves open how

much support a line of work deserves and what would be lost by concentrating elsewhere. An attractive picture of mathematical unity has not yet answered a question about priorities.

There is also a quieter way for pure mathematics to become the default meaning of mathematics. Higham observes that the broadly titled *Princeton Companion to Mathematics* is essentially about pure mathematics. The editorial concentration may be deliberate and defensible. Its cultural effect is still worth naming. One part of the discipline receives the unqualified name, while another needs an adjective and a companion volume of its own. [98]

The default appears at sentence level in Gowers's review of Paul Nahin. When a pursuit problem turns from analytic derivation to discretized numerical diagrams, he says that Nahin “abandons the mathematics.” The surrounding review accepts simulations, praises engineering insight and says that the diagrams are good. Precisely that coexistence makes the phrasing revealing. Numerical work may be welcomed while the unqualified name mathematics remains attached to the analytic argument. [105]

The criticism concerns this reservation of authority. One activity receives the encompassing name and the right to set the comparison. Other activities receive approval on terms it supplies. A serious comparison of analytic and numerical treatments would identify what each establishes, which features each reveals and what each costs. Calling the numerical turn a departure has already settled part of the cultural ranking before undertaking that work.

Reform and the authority it leaves intact

Zeilberger's criticism of Gowers presses on what mathematical reform should change. His review of the short introduction objects to the treatment of existing computer-assisted achievements and the positive connotations of mainstream status. Opinion 137 challenges a proof-centered conception of mathematics. The recurring question is whether a broader range of work will be allowed to change the criteria by which mathematical achievement is recognized. [99] [100]

The publishing dispute shows why the exact charge matters. Opinion 120 urges a boycott of all subscription journals. Gowers's linked reply agrees with the wider aim and explicitly wants hiring and evaluation to become independent of misleading journal stamps. His choice of Elsevier as an initial target is tactical. Opinion 156 raises a further question about selective endorsement in overlay publishing. Cheap distribution can coexist with a familiar hierarchy of whose work receives authoritative recognition. To assess the reform, one has to follow both changes. [101] [38]

Opinion 169 attacks Gowers's treatment of the Hill affair, in which publication procedure and criticism of the paper became entangled. Gowers condemned suppression while finding fault with the model. His later post supplies a more concrete occasion for criticism. He says he now regards the selectivity hypothesis as quite reasonable and had begun to recognize this while writing. It would have been more sensible to omit the criticism, but attachment to the text helped keep it in the published post. He also modifies another criticism while retaining others. [102]

The correction is part of the record. So is the decision it corrects. A public judgment carrying substantial authority went out with an objection its author already had reason to doubt. Readers then had to do work that the criticism should have survived before publication. This resembles the earlier performance of premature triviality. In both cases, the authority of the verdict arrives before the comparison is complete.

It gives a precise object for criticism without settling the merits of Hill's model or the full history of its treatment.

A weak paper can be mishandled, and a critic can identify a technical weakness while diverting attention from a procedural wrong. Conversely, condemning a publication decision leaves the paper's merits open to examination. Public authority becomes irresponsible when one judgment is made to settle all these questions at once. The convenient conflation saves the commentator work and makes the person affected pay for the confusion.

Precision makes the criticism harder to evade. A general complaint about elitism can be dismissed as resentment. A specified mismatch between a criterion and its application puts the evaluator's own performance at issue. The relevant question ceases to be whether the author knows their place. It becomes whether the person assigning that place can explain the assignment.

IV. Making authority answer for itself

Putting an entire field in its place

Koblitz's 2007 article makes the conversion from criticism into disciplinary rank unusually visible. He writes with direct experience of cryptography, including service as a Crypto program chair. Discussing deadlines and minor papers, he contrasts mathematicians' long perspective with the haste of computer science and cryptography, then suggests that the latter scarcely accept the superiority of one excellent paper to many worthless ones. The comparison settles its question through the adjectives. Once one paper is called excellent and the others worthless, the conclusion follows by definition. What remains to be shown is whether the smaller contributions deserve that description. [66]

Mitzenmacher identifies the loaded choice. A profession may produce too much incremental work without its increments being worthless. Katz objects to the elitism of the wider portrait. Goldreich disputes the inferences drawn from deadlines and defective proofs. Krawczyk gives a competing account of how formal analysis improved a protocol while acknowledging a correction. Wigderson explains why the adversarial setting makes explicit models and reductions essential. These replies ask the distinguished critic to do the discriminating work his distinction claims already to have done. [67] [69] [70] [71] [73]

Barak's reply isolates three questions that a sweeping judgment can run together. What exactly is claimed? How credible are the assumptions? Is the proof correct? His distinction is useful far beyond cryptography. A proof may correctly establish an implication whose hypotheses inadequately describe the intended situation. A model may be valuable while a published proof contains a repairable gap. Calling everything bad mathematics saves the critic the trouble of identifying where the difficulty lies. [68]

The descent into personal detail makes the hierarchy more conspicuous. Trevisan objects to attention being spent on typesetting and spelling alongside the attacks on the field. Eppstein answers with an openly biased satire. The replies expose another failure of proportion. How do particular errors justify

turning an entire profession into the intellectually inferior party? Personal disparagement supplies an answer only by abandoning the comparison the critic owes. [72] [74]

Goldreich's methodological defense adds the positive task. Clear definitions and rigorous inference can expose threats that ordinary experience fails to anticipate. An account of applied mathematics that treats its demands for proof as a pretentious imitation of pure mathematics would miss the reasons those demands arise from the application itself. Practical work can require greater care precisely because a result has to survive contact with an adversary, a machine or the world. [75]

The obligation grows with the sweep of the dismissal. Someone who pronounces on an applied field has to learn why its practitioners chose their definitions, which failures they were designed to prevent and what the proposed criticism would improve. The ability to detect a defect in an implication gives no automatic understanding of the threat the implication was meant to control. Mathematics used against another field can be exact at the blackboard and ignorant about its object.

When a solution is denied its name

Avigad's essay records the boundary being enforced after difficult questions have been answered. An unnamed mathematician dismisses the resolution of Keller's conjecture as a “finite computation”. Another colleague treats Hales's proof as unlike the kind of solution a traditional mathematician seeks and calls Flyspeck computer science. The comments belong to the speakers Avigad reports. Correctness is conceded while belonging to the preferred category is withheld. [79]

Avigad distinguishes belonging from popularity, importance and academic recognition. The distinction brings the cultural issue into focus. Classifying a verification as computer science locates expertise, but does not explain an intellectual deficiency in the solution. The reported judgments admit the achievement while keeping its method outside a preferred account of mathematical understanding. Who gets to decide whether success should revise that account? [79]

Zeilberger reads Avigad's account as preserving a hierarchy that places conceptual mathematics above computational knowledge. Avigad's response, which Zeilberger links, explicitly supports computers and explains that his aim was to examine the conceptual ideal. The dismissive judgments reported in the original essay belong to its unnamed speakers. Larson presses the importance of useful algorithms against an inward-looking conception of significance. The exchange brings a substantive question into focus. How deeply should computation change mathematics' understanding of its own achievements? [40] [80] [81]

Nathanson identifies the converse asymmetry. A result that fits an established mathematical community can receive ready acceptance, while an outsider result faces a greater demand for proof. His diagnosis makes selective rigor the issue. The burden of verification should follow the argument's gaps and difficulties. Letting familiarity determine that burden gives insiders an advance on trust and charges outsiders interest. [108]

Rigor and access

The Jaffe–Quinn controversy brings the allocation of unfinished work into view. Their proposal and reply argue for identifying the status of mathematical claims. One concern is that announcing a conjectural account can spend the available credit before someone else supplies its missing proofs. Another is the position of readers outside the leading centers, who depend on the reliability of what has been written. A profession's informal understanding may be extensive while remaining inaccessible to precisely those readers. [77] [78]

The responses contest who would gain authority from the proposed standards. Uhlenbeck sees combined elitism in the special status accorded an exchange between pure mathematics and high-energy physics. Atiyah accepts the distinction between proof and heuristic argument while rejecting an authoritarian account of discovery and credit. Thom satirizes professional certification. Their disagreement concerns how rigor can be entangled with the standing of the people claiming to administer it. [14] [15] [16]

The asymmetry is practical. A well-connected mathematician can discover which conjecture is dependable, where a proof is missing and whom to ask for an explanation. A distant reader has the published text. When the literature depends on tacit knowledge possessed by a small circle, open verification has acquired a social admission requirement. Demanding a reliable written account can challenge that privilege.

Atiyah presses the converse danger, that valuing only the final rigorous form can shortchange the conception that made it possible. A polished proof can conceal examples, conversations and exploratory ideas through which the problem became intelligible. Someone who supplies the accepted form may then appear to have supplied the whole achievement. Alongside Jaffe and Quinn's concern about uncredited proof work, this gives a two-sided requirement. The account of a contribution has to preserve its actual dependencies. [15] [77]

Both failures suppress a dependency and allocate authority as though nothing important had been left out. One leaves a reader dependent on an elite's unwritten knowledge. The other effaces the labor on which the written result depended. The same habit runs through the devaluation of computation, explanation and teaching. A narrow description of the achievement supplies an equally narrow list of people entitled to recognition.

Authority that can answer

The recurring failure is a one-sided distribution of intellectual obligations. A reduction is pronounced before its hypotheses are compared. A computational solution is acknowledged while being placed outside the preferred category of mathematics. Teachers are assessed through an authority that discounts their practical knowledge. The critic's standing makes the verdict easy to deliver. The person on its receiving end must supply the missing distinctions and reasons. [33] [79] [57]

Pure-mathematical snobbery makes this imbalance look like high standards. The result is too special, the computation merely verifies, the explanation is elementary, the application lacks depth. Such judgments require arguments of their own. Their usefulness as status devices lies in their capacity to end discussion before those arguments have been supplied. A profession can be meticulous about the conclusions inside a paper while being careless about the conclusions it draws about the paper and its author.

Zeilberger's public self-correction and Nathanson's insistence on inspectable arguments supply the constructive standard. Make the judgment answerable to the work. Explain the connection, expose the missing step, and give a question the attention needed to discover whether it matters. Zeilberger's computational practice and Nathanson's exposition also show what the hierarchy discounts. They make methods available for others to use, test and extend. [33] [44] [107] [109]

The test developed in *When a Description Becomes a Verdict* asks what an account preserves and which conclusions it supports. Describing a contribution requires the same care. Purity, elegance, abstraction and difficulty specify too little to settle its worth. An argument may expose a constraint, a computation may settle a question, and an explanation may put a method within someone else's reach. Each demands an assessment of the work accomplished, including whatever an inherited hierarchy encourages the critic to overlook.

If a result is trivial, show the reduction. If a method is inadequate, identify the failed guarantee. If a subject is unimportant, state the comparison and defend it. If someone asks for an example, supply one or explain the obstruction. If an earlier judgment was wrong, correct the record where it did its damage. The critic owes the precision demanded of the work. These obligations become more pressing when the judgment comes from someone whose reputation can settle the room before the argument begins.

A pure mathematician's reputation makes an unsupported dismissal more consequential. It increases the obligation to supply the missing reduction or neglected comparison. When prestige lets its holder leave that work to everyone else, the profession rewards the performance of judgment while somebody else does the judging. Rigor becomes a demand imposed downward and an inconvenience waived at the top. That is the pettiness this essay condemns, and no theorem makes it respectable.

Notes and sources

The complete collection contains 109 records. Numbered links in the essay identify the works used in its argument. Entries marked “Further reading” are included for context and continued investigation. Several records concern the same event or text. They should be read together.

Each entry links to the original or available host and to an annotation explaining its relevance, location and evidentiary limits. Some links supply excerpts or bibliographic records. Source access and descriptions were checked in November 2026.

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