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Mathematics in Literature

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Synopsis

A lightly edited version of a Public Talk intended for a general audience, this essay examines significant appearances of mathematics, mathematical education, and attitudes to mathematics in, particularly, English and French literature. Both serious and light-hearted sources are considered. No attempt is made to be comprehensive.

Having become the first two men to arrive on the moon, H. G. Wells's Mr Bedford and Mr Cavor [43] soon suffer the same fate as that of Lemuel Gulliver [40] on the first of his Travels: that of being tied up by the locals, who on the moon are not Lilliputians but Selenites.[2] The two men next wonder how to communicate with aliens with whom one shares neither language nor bodily form. Cavor remembers a suggestion, said to come from Francis Galton, that you should display knowledge of basic truths of Euclidean geometry, on the supposition that, if the aliens are intelligent, they too will know these truths. For example, if a triangle has two equal sides it also has two equal angles. Or, if you construct squares on the sides of a right-angled triangle, the area of the square opposite the right angle is equal to the total of the areas of the other two squares [Pythagoras' Theorem].

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[2]Editor's note: Several entries in the bibliography are in public domain and readily available in multiple versions and formats.

As it turns out, the men are untied without recourse to geometry, and, within 50 pages of the book, Bedford has returned to Earth, leaving Cavor stranded. We now hear from Cavor only by means of messages flashed across the space between moon and planet. We learn in this way that some of the Selenites are mathematicians:

> If ... a Selenite is destined to be a mathematician, his teachers and trainers set out at once to that end. They check any incipient disposition to other pursuits, they encourage his mathematical bias with a perfect psychological skill. ... the mathematical faculties of his brain grow, and the rest of him only so much as is necessary to sustain the essential part of him. At last, save for rest and food, his one delight lies in the exercise and display of his faculty, his one interest in its application, his sole society with other specialists in his own line. His brain grows continually larger[;] ... the portions engaging in mathematics ... bulge ever larger and seem to suck all life and vigour from the rest of his frame. His limbs shr1ivel, his heart and digestive organs diminish, his insect face is hidden under its bulging contours ... ; he seems deaf to all but properly enunciated problems. The faculty of laughter, save for the sudden discovery of some paradox, is lost to him; his deepest emotion is the evolution of a novel computation.

This satire evokes standard stereotypic images, in particular the antisocial mathematician locked in his own frame of reference. But two good key words *do* appear in the passage: "application" and "computation". What do we mean by an "application" of mathematics? The term "Applied Mathematics", as commonly used, refers merely to certain particular areas of application. However, results from one area of pure mathematics can be used to solve a problem in another such area; this too is an "application" of the results, an application internal to mathematics. Other people will instead be interested in external applications, such as using mathematics to help understand biological processes.

When Wells mentions computation, we must acknowledge that not all mathematicians are particularly interested in computing anything at all. But we must vehemently contradict any notion that no mathematician will listen to your problem unless it is "properly enunciated" or "correctly formulated".

A consultant mathematician or statistician must be ready to help to *formulate* a problem – which may often be substantially different from what the client thought it was.

Ioan James [21] quotes an early eighteenth century work by the physician Bernardino Ramazzini [33] that is so similar to Wells's tirade that we may ask whether the two texts were independently written. Here is Ramazzini, translated into English [34]:

> Mathematicians have to ponder the most abstruse problems far removed from material existence, and to this end the mind must be kept detached from the senses and have hardly any dealings with the body; hence mathematicians are nearly all dull, listless, lethargic and never quite at home in the ordinary affairs of men. It follows that all the organs and in fact the whole body moulder, as it were, and become torpid and feeble as though condemned to perpetual darkness.

Did Wells know of Ramzzini's text? Is this true 'intertextuality'?

Another author who sent a man to the moon was Edgar Allan Poe who, in the short story *The Unparalleled Adventure of one Hans Pfaall* [30], expects us to do some mathematics with him, during Pfaall's journey:

> ... the barometer showed an elevation of 26,400 feet, or five miles to a fraction. ... it is very easily calculated by means of spherical geometry, how great an extent of the earth's area I beheld. The convex surface of any segment of a sphere is, to the entire surface of the sphere itself, as the versed sine of the segment to the diameter of the sphere. Now, in my case, the versed sine – that is to say, the *thickness* of the segment beneath me – was about equal to my elevation ... 'As five miles, then, to eight thousand', would express the proportion of of the earth's area seen by me. In other words, I beheld as much as a sixteen-hundredth part of the whole surface of the globe.

Wow! We here need to know what is meant by "segment" (not the same as a segment of an orange) and by "versed sine" (an obsolete term that has had mutually contradictory meanings). I suspect that most readers abandon any attempt to understand this, as Tristram Shandy [38, Book II, Chap. 3] similarly did when Uncle Toby found the path of a projectile

> '... to be a Parabola – or else a Hyperbola, – and that the parameter, or *latus rectum* of the conic section of the said path was to the quantity and amplitude in a direct ratio, as the whole line to the sine of double the angle of incidence, formed by a reach upon an horizontal plane ...'

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Literature has many examples of young people learning mathematics, or at least confronted by it. Jules Supervielle's poem *Mathématiques* [39] expresses something very different from the "elevation and composed delight" that Wordsworth, in the *Prelude*, found in geometry [45]:

> Quarante enfants dans une salle,
> Un tableau noir et un triangle,
> Un grand cercle hésitant et sourd,
> Son centre bat comme un tambour...

which can be translated, with a little freedom, as

> Forty children in a room,
> A blackboard with a triangle,
> A large circle, uncertain and deaf,
> Its center throbs like a drum.
> Letters, exiles, outcasts,
> Waiting in pain.
> The harsh parapet of a trapezium,
> A voice rises and falls,
> And the raging problem
> Bites its tail in its frenzy.
> An angle opens its jaws.
> Is it a hound? A she-wolf?
> And every number in the world,
> All those insects that tear down
> And rebuild their ant-hill
> Beneath the dazed glazed gaze of the boys.

So the children of line 1 turn out in the final line to be – surprise, surprise – boys. This is not the first time in literature that 40 pupils are later revealed as all being *male*. Gulliver reports that, when he visited the Grand Academy of Legado, in the third of his satirical Travels,

> The first professor I saw was in a very large room, with forty pupils about him ... observing me to look earnestly upon a frame, which took up the greatest part ... of the room, he said ... that ... , by his contrivance the most ignorant person ... might write books in philosophy, poetry, politics, laws, mathematics and theology, without the least assistance from genius or study.

Words were pasted inside this frame.

> The pupils, at [the professor's] command, took each of them hold of an iron handle, whereof there were forty fixed round the edges of the frame; and giving them a sudden turn, the whole disposition of the words was changed.

Whenever any meaningful sequence of three or four words appeared fortuitously, one of the "*lads*" wrote it down for future use in some *magnum opus*.

The mood of Supervielle's poem has something in common with that of the poem *Numbers* by Lawrence Binyon [4]:

> Bodiless Numbers! ...
> O inhuman numbers! ...
> Are you masters or slaves —
> Subtlest of man's slaves, —
> Shadowy Numbers?

Victor Hugo [17] was in no doubt about whether they were masters or slaves; they were "black executioners":

> J'étais alors en proie à la mathématique. ...
> Temps sombre ! enfant ému du frisson poétique, ...
> On me livrait tout vif aux chiffres, noirs bourreaux ....

Carl Sandburg's poem *Arithmetic* [35] (in [13]) is not much happier:

> Arithmetic is where numbers fly like pigeons in and out
> of your head. ...
> Arithmetic is numbers you squeeze from your head to your hand
> to your pencil to your paper till you get the answer.

> Arithmetic is where the answer is right and everything is nice
> and you can look out of the window and see the blue sky
> – or the answer is wrong and you have to start all over
> and try again and see how it comes out this time.

Let us now move from forty boys to just one, the child in Colette's *L'Enfant et les Sortilèges* [The Child and the Magic Spells] [8]. This boy, having seen the golden-haired Princess snatched away from him, then beholds something quite different:

> Un petit vieillard bossu, crochu, barbu,
> vêtu de chiffres, coiffé d'un π
>
> [An old, small, bearded hunchback,
> his garments made of numbers,
> his hat shaped like the Greek letter π]

And this *vieillard* is reciting scraps of numerical problems:

> 'Deux robinets coulent dans un réservoir!
> [Two taps run into a tank!]
> Deux trains omnibus quittent une gare —
> [Two stopping trains leave a station —]
> Une paysanne
> [A country-woman]
> Porte tous ses œfs au marché !
> [Carries all her eggs to market!]'

And the child cries out in terror:

> 'Mon Dieu! C'est l'Arithmétique!'

The old man then dances round him, singing nonsense arithmetic:

> 'Quatre et quat': dixhuit,
> Onze et six: vingt-cinq ... .'

The child is as dazed as Charles Dickens professed to be [10] when he visited a school for paupers' children in the poverty-stricken East End of London:

> Take the square of five, multiply it by fifteen, divide it by three, deduct eight from it, add four dozen to it, give me the result in pence, and tell me how many eggs I could get for it at three farthings apiece.

[A farthing was a quarter of a penny, and a penny was a twelfth of a shilling.]

Colette's Old Man Arithmetic could well have inspired the Mathemagician in Norton Juster's *The Phantom Tollbooth* [22] (in [13]), who

> was dressed in a long flowing robe covered entirely with complex mathematical equations and [in] a tall pointed cap that made him look very wise.

The French philosopher, poet and mathematician Paul Valéry tells an interesting true story about numbers in one of his *Cahiers* [Notebooks] [42, Tôme II, p. 798]:

> Vu Estaumier, nommé Directeur de l'École Supérieur des PTT. Me dit que, enfant, à 6 ans il avait appris à compter jusqu'à 6 – en 2 jours. Il comprit alors qu'il y avait 7, et ainsi de suite, et il prit peur qu'il fallût apprendre une infinité de noms. Cet infini l'épouvanta au point de refuser de continuer à apprendre les autres nombres.

So Estaumier, Director of the Post Office Academy, had learned to count up to 6 at the age of 6. He then realised that there must be a 7, for which he would have to learn a new name. *And So On*! And, fearing that a whole infinitude of names must be learnt for this infinite series, he gave up. As a 6-year-old, he did not know that, if you learn the numbers 1 to 9 and the number 30, you then can count from 31 to 39, this last number being the one that we associate with John Buchan [6] and the goings-on at Bradgate (in real life Broadstairs, on the Kent coast in England):

> "Thirty-nine steps – I counted them – high tide, 10.17 p.m."

Estaumier is not alone in getting stuck after the number 6. Here is a sad tale from the *Literature of the Absurd*; the author is Daniil Kharms [23]:

> An amazing thing happened to me: I suddenly forgot which number came first, 7 or 8. I went round to my neighbours and asked them for their opinion. I was truly amazed that they too could not remember which order the numbers came in.
>
> We all went round to the Gastronom shop at the corner of Znamensky Ulitsa and Basseynaya Ulitsa and asked the cashier. She smiled sadly, took a tiny hammer out of her mouth, and – with a slight twitch of her nose — said 'I think 7 comes after 8 whenever 8 comes after 7.'
>
> We thanked the cashier and ran, full of glee, out of the shop. But then, thinking over what she had said, we fell silent again, as her words turned out to be nonsensical.
>
> What were we to do? We went into the Lyetiny Sad [the Summer Garden] and counted trees. But after reaching 6, we stopped and argued. Some of us thought 7 came next, and others thought it was 8.
>
> We had a long argument, but fortunately a little boy fell off a park bench and broke both his jaws. This distracted us from our arguing.
>
> Then we all went home.

(This translation is based on scrutiny of the original, on translations to be found via the Web, and on George Gibian's translation in [15, pp. 296–297]. Some translations inappropriately destroy the Soviet atmosphere.)

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Many languages have mnemonic rhymes to help us learn the numerical sequences:

> One, two, buckle my shoe,
> Three, four, knock on the door,
> Five, six, pick up sticks,
> Eight, seven, God's in Heaven!

Of course eight comes before seven! Or does it?:

One, two, three, four, five,
Once I caught a fish alive!
Six, seven, eight, nine, ten,
Then I put it back again.

French has something similar:

Un, deux, trois, allons dans les bois [let's go to the woods],
Quatre, cinq, six, cueuillir des cerises [to gather cherries],
Sept, huit, neuf, dans mon panier neuf [in my new basket],
Dix, onze, douze, elles seront toutes rouges [they'll all be red]!

We award only '*un point*' out of four for rhymes here. In German, "alte Hex" is an old witch:

Eins, zwei, Polizei,
Drei, fier, Offizier,
Fünf, sechs, alte Hex,
Sieben, acht, gute Nacht.

Just before we move on from counting, let us take *Les belles familles* by Jacques Prévert [31]:

Louis un
Louis deux
Louis trois
Louis quatre
Louis cinq
Louis six
Louis sept
Louis huit
Louis neuf
Louis dix (dit le hutin) [Louis the Quarrelsome]
Louis onze
Louis douze
Louis treize
Louis quatorze
Louis quinze

Louis seize [XVI]
Louis dix-huit [XVIII]
et plus personne, plus rien [and then nobody, nothing]
Qu'est-ce que c'est que ces gens-là [Who were these guys]
qui ne sont pas foutus [that they couldn't even]
de compter jusqu'à vingt? [count up to 20?]

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Amongst the worst *bad* mathematics that I know in literature is a passage from Henry James. In the 1870's, he was fulminating about the building of the Isle of Wight railway from Ryde to Ventnor [20]:

> ... a railway in the Isle of Wight is a gross impertinence, is in evident contravention to the natural style of the place. ... Never was a clearer opportunity for sacrificing to prettiness; never was a better chance for not making a railway. But now there are twenty trains a day, so that the prettiness is twenty times less.

Assessing this needs only simple arithmetic. Before the railway was built, Henry James might well have ranked the Isle of Wight, on a nought-to-ten scale of prettiness, at about 9. Multiplying this 9 by 20 gives 180. If the prettiness is now 20 times less than it was before, it is $9 - 180$, that is to say, -171, *on a nought-to-ten scale of course!* And does James really believe that prettiness is reduced proportinately to the number of trains run? This would mean that the original prettiness could be restored by a Rail Strike.

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University studies of mathematics feature in some nineteenth century literature, notably in two of our finest books.

When young Daniel Deronda, in George Eliot's great novel of the same name [12], consults his guardian, Sir Hugo, before 'going up' to Cambridge, Sir Hugo responds like this:

> 'I should think you can take up anything you like. You are in deeper water with your classics than I ever got into, and if you are rather sick of that swimming, Cambridge is ... where you can go into mathematics with a will. ... I should like you to do yourself credit, but for God's sake don't come out as a superior kind of idiot, like young Brecon, who got a Double First, and has been learning to knit braces ever since.'

In the event, Daniel

> applied himself vigorously to mathematics, ... and the favourable opinion of his tutor ... determined him to try for a mathematical scholarship in ... his second year .... But ... he felt a heightening discontent with the wearing futility and enfeebling strain of a demand for excessive retention and dexterity without any insight into the principles which form the vital connections of knowledge.

No mean piece of educational commentary!

At about the age of 15, Victor Frankenstein beheld the effect of a lightning strike on an oak tree which was thereby "reduced to thin ribands of wood." This, Mary Shelley tells us [36], gave him a lively interest in natural philosophy, and he reports that

> In this mood I betook myself to the mathematics, and the branches of study pertaining to that science, as being built upon secure foundations, and so worthy of my consideration.

When, two years later, Frankenstein went to the University of Ingolstadt, in Bavaria, Professor Waldman advised him

> 'If your wish is to become really a man of science, and not merely a petty experimentalist, I should advise you to apply to every branch of natural philosophy, including mathematics.'

But the force of Frankenstein's destiny was already so heavily upon him, that Waldstein's advice served only to precipitate the young student to his doom, to his "utter and terrible destruction."

At least Deronda and Frankenstein had *aptitude* for mathematics, and they applied themselves to the subject. Not so Amory Blaine who, at the start of his third year at Princeton, in Scott Fitzgerald's *This Side of Paradise* [14], spends "four hours a morning in the stuffy room of a tutoring school, imbibing the infinite boredom of conic sections". The tutor "drew diagrams and worked equations from six in the morning until midnight". Amory "found it impossible to study conic sections; something in their calm ... respectability ... distorted their equations into insoluble anagrams". Why

Princeton students had to pass an exam in conic sections in order to get anywhere, we may well ask. The requirement even extended to the sporting types, including the student Langueduc, who was merely "six-foot-three of football material."

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For me, perhaps the finest piece of literary writing involving mathematics is Aldous Huxley's miniature masterpiece *Young Archimedes* [19] (in [13]). This is not (as the title might suggest) a tale of ancient Syracuse, but the story of a Tuscan peasant-boy, Guido, who has outstanding natural abilities. But just as George Eliot's *Daniel Deronda* is in a sense two books – the 'English' book and the 'Jewish' one – naturally interlocking and interacting, with the whole greater than the sum of the parts, so Huxley's *Young Archimedes* is *two* accounts. We firstly have the glorious word-painting of the Tuscan landscape, its splendours changing with the seasons, with the weather, with the time of day; the landscape with its mountains and valleys, its woods and its wilderness, its dwelling-houses and its cultivated terraces. *Then* we have the characters of the story. There's landlady Signora Bondi. Before we know what a force for evil she is, we smile when we are told that

> Her vitality, if you could have harnessed it and made it do some useful work, would have supplied a whole town with electric light.

We have the English family who are the tenants, including 4-year-old Robin. And we have the peasant family in the adjoining building, including the precocious but patient Guido, aged between 6 and 7.

When the Englishman first plays, on his gramophone, a record of the slow movement of Bach's Double Violin Concerto [3], Guido – who has previously known only guitar music – is transfixed. He can appreciate the interweaving of the parts, he can sing back a long phrase, he wants more. We may ask whether he heard the movement played at the very slow tempo used some 50 years ago, or at one of the faster tempi of today (which are, of course, still slow if you count 4 in a bar instead of 12). But does it matter?

One afternoon, when the boys were playing together in the garden, they fell suspiciously quiet. Robin's Babbo [Papa] looked out from the balcony to see what was going on below. He saw

> Guido, with a burnt stick in his hand, demonstrating on the smooth paving stones of the path, ... the Theorem of Pythagoras – not in Euclid's way, but by the ... method ... which was, in all probability, used by Pythagoras himself.

Here we have unspoilt genius, and who knows what would have been the future if the malign Signora had not been around. When the tragedy comes – and it is terrible – it comes off-stage. We are spared to that extent. And above the misery of the two fathers as they visit Florence afterwards, it was

> a day of floating clouds – great shapes, white, golden, and gray; and ... On the innumerable brown and rosy roofs of the city the afternoon sunlight lay softly, sumptuously, and the towers were as though varnished and enamelled with an old gold.

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From fictional tragedy to a long-standing horror from real-life. As a great-grandson of a member of the 11th Regiment of Foot in the late 1870's and early 1880's, I am enraged by the long continuance of the miseries involving Britain and Afghanistan. In *Arithmetic on the Frontier*, Rudyard Kipling wrote of Britain's 1898 excursion into the borderlands between Afghanistan and Pakistan [25]:

> A scrimmage in a Border Station,
> A canter down some dark defile,
> Two thousand pounds of education
> Drops to a ten-rupee *jezail*. ...
>
> No proposition Euclid wrote,
> No formulae the text-books know,
> Will turn the bullet from your coat
> Or ward the tulwar's downward blow.

[A "jezail" is an Afghan musket, and a "tulwar" is a sabre.]

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There is no room in an essay such as this for a discussion of statistical matters such as Charles Dickens' rant in *Hard Times* [11, Chap. 1] against "tabulations", and Aldous Huxley's instance in *Brave New World* [18, Chap. 3] of what can happen on a planet with vastly more inhabitants than surnames. And I can mention just one character from Australian literature: mathematics mistress Greta McCraw (in origin, a Scotswoman), whose

> bony frame took on the proportions of one of her own Euclidean triangles, ... who in times of crisis could be unexpectedly shrewd, even practical ...

but who, in Joan Lindsay's book, disappeared for ever, with two of her girls, at *The Picnic at Hanging Rock* [28].

I have also forced myself to stay within the four dimensions of space and time; I have left out fantasies based on Möbius strips and Klein bottles. I have said nothing of literature built on Fibonacci numbers and codes and cyphers and cryptograms, this literature ranging from high-class works such as Edgar Allan Poe's story *The Gold-Bug* [29] to 'page-turners'. As, since boyhood, I have known the magnificent Rosslyn Chapel (just outside Edinburgh, Scotland), where the action ends in one such book, I am well aware of the flood of tourists that the book has caused to descend on the Chapel, bringing revenue much needed for its restoration following a disastrously inappropriate treatment of the stonework. But how I wish that visitors would devote their attention to the extraordinary splendours of the architecture and stone-carving, rather than to the Chapel's legends and the recent fictional action.

I have also ignored parodies until now but, given my Scottish background, I must at least quote two stanzas of Sir Arthur Quiller-Couch's unco witty "New Ballad of Sir Patrick Spens" [32] (in [13]), based on [1]:

> The king sits in Dunfermline toun,
> Drinking the blude-red wine,
> 'O wha will rear me an equilateral triangle
> Upon a given straight line?'
>
> O up and spake an eldern knight,
> Sat at the king's richt knee —
> 'Of all the clerks by Granta side
> Sir Patrick bears the gree.'

(Dunfermline was for a while the *de facto* capital of Scotland. "Granta" is both the old name of the River Cam in Cambridge, England, and the current name of part of the Cam.)

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But whether or not certain theological writings are to be considered as theology or as literature, there is one further major topic that must be considered. It goes back at least to that notorious sentence written in Latin by St Augustine of Hippo [2]. One of the English translations is this:

> The good Christian should beware of mathematicians and of all those who make empty prophecies.

Now sure, the Latin has the word *mathematice*, but the suggestion has been made (it is easily to be found on the Web) that the word should be translated as *soothsayer*. What *is* going on? Here, as for similar situations from a thousand years or more after St Augustine, we must ask not only 'What were mathematicians *actually doing*?', but also 'What were they *perceived* as doing?', and, if they were employed by someone, 'What were they *employed* to do?' In particular, were they using their mathematics to make astrological predictions and to make incursions into philosophy and divinity? In England, in Tudor times [44], the authorities "burned mathematical books" judging them to be "conjuring books", and if a book had red letters or mathematical diagrams this was sufficient [41] for it to be judged "Popish or diabolical." Even Sheridan's Mrs Malaprop [37] was at it:

> 'I would by no means wish a daughter of mine to be a progeny of learning; ... neither would it be necessary for her to handle any of your mathematical, astronomical, diabolical instruments:- But ... she should have a supercilious knowledge in accounts; – and ... I would have her instructed in geometry, that she might know something of the contagious countries ... .'

Ah! – if only we had Mrs Malaprop's opinion of the Four Color Theorem ...

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Running back again over the centuries, we encounter the Alexandrian mathematician Hypatia, daughter of Theon Alexandricus, with whom she worked on mathematical topics including Euclidean geometry. She lived during St Augustine of Hippo's lifetime. In Charles Kingsley's historical novel *Hypatia*, which he claimed to have researched carefully, Theon paces impatiently up and down the room, wrestling with a mathematical problem and crying out [24, Chap. 2]

> 'the symbol should be an expanding series of the powers of three, and yet that accursed binary factor *will* introduce itself.'

He seems to be doing pure mathematics (although none of my eminent colleagues can tell me what). But later he is to ask [24, Chap. 15]

> 'Are we to study ... conic sections, that we know better how to construct machinery; or rather to devise from them symbols of the relations of Deity to its various emanations?'

Likewise Hypatia asks us [24, Chap. 15]

> 'to recognise[,] in the equilateral triangle inscribed within the circle, and touching it only with its angles, the three supra-sensual principles of existence, which are contained in Deity ... '.

She is murdered by the Christian mob. What an irony it is that, as painted high in the apse of the now magnificently restored 18th century church of St Paul, Deptford (in South-East London, England), an inverted equilateral triangle, inscribed in a circle, symbolises the Christian Trinity.

Leaping back to French literature, we have Maldoror, from the *Chants de Maldoror* by Lautréamont [27], who, having forsaken God, is an acolyte of a mathematical trinity:

> Arithmétique! algèbre! géometrie!
> trinité grandiose! triangle lumineux!
> Celui qui ne vous a pas connues est un insensé!

———o———0———o———

From our literary examples, what conclusions can be drawn about the actual and perceived roles of mathematics in our civilisation and our society? Not many, I fear. We might suppose that a long time, perhaps centuries, would be needed to recover from the religious anathematisation of mathematics. But we must then ask whether mathematics fared better in parts of the world not influenced by Christianity and by the Reformation. As for notions that mathematics is boring, terrifying or impenetrable, why should we blame this on mathematics rather than on some of its teachers and their teaching methods?

And in universities, the milieu in which this article was written? I suggest that aggro between mathematicians and non-mathematicians is not especially likely to arise there because a particular mathematician has "bulges above an insect face", or deposits of pigeon-poo on the brain. Trouble seems more likely to come from all parties being required to share teaching facilities, to have common protocols for assessing staff and student performance, and to attend teacher-training sessions where there is little or no recognition of the distinctive methods appropriate for teaching mathematics. Also, a University mathematician who shows symptoms of being 'torpid' or 'listless' may be like that, not because of being a mathematician, but because of not having learnt how to manage their time and not having suitable colleagues to work with. Nor should it be supposed that every mathematician is witless at everything except mathematics; if that were so, I myself, an academic mathematician and qualified musician, would have upset Rudyard Kipling [26], who opined that a politician immersing himself in university affairs "will be as much out of place as a mathematician set up to lecture on the graces of literature and art". Of course, ribbing the supposedly archetypal mathematical don can be fun, as Edmund Crispin showed [9]:

> They were going down a narrow path, flanked by high yew hedges, which skirted the churchyard. And from the other side of these hedges they suddenly heard a voice.
>
> '*You may seek it with thimbles,' . . . 'and seek it with care, you may hunt it with forks and hope. . .*'
>
> Fen stopped dead. 'I know who that is', he said gloomily.
>
> '*You may threaten its life with a railway share,*' pursued the voice, '*You may charm it with smiles and soap. . .*' . . .

> 'That, I fancy,' said Fen grimly, 'is the Regius Professor of Mathematics.'
>
> A gruff, hairy, little old man put his head over the hedge. ...
>
> 'I am holidaying,' said the head. ... 'I shall accompany you.' ... 'I shall recite you *The Hunting of the Snark*.' ...
>
> 'Are you sure you want to?' [Fen] asked feebly.
>
> 'I am sure of nothing,' said the [Regius] Professor, 'except the differential calculus. And I'm not as good on that as I used to be.'

– which may be as good a way as any of bringing Lewis Carroll into my text [7].

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POSTSCRIPT: **This essay is a revised version of talks given at**

- **the University of Kent, Canterbury, England;**
- **a meeting of the M500 mathematicians of the Open University, England;**
- **a Goldsmiths' Course for 6th Form teachers, at Queen Mary, University of London, England.**

The first of these occasions marked my 70th birthday. A. E. Housman's *Shropshire Lad* [16, Poem II] was 20 when he recorded the loveliness of the cherry-blossom. He had heard that the expected human life-span was three score years and ten. Elementary subtraction (without a pocket-calculator!) gave him fifty more years to go,

> **And since to look at things in bloom**
> **Fifty springs are little room,**
> **About the woodlands I will go**
> **To see the cherry hung with snow.**

I do not know how many more times I myself shall see the cherry-trees bloom, but, for me, 70 years have been "little room" for mathematics and literature, perhaps partly because I have spent so much of that time asleep:

> **L'homme, dont la vie entière**
> **Est de quatre-vingt-seize ans,**
> **Dort le tiers de sa carrière,**
> **C'est juste trente-deux ans.**
> **– Boileau [5].**

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