

## Adding Emotion to a Mathematics Book with Pop Song Poetry

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### Abstract

In this paper we describe how we created a cycle of fourteen poems to add emotional context and a big picture perspective to a mathematics book. We wanted to show that:

*Maths is more than measurement and number calculations  
More than geometry, statistics and algebraic manipulations  
So we set out to elucidate its beauty, heart and history  
Its concepts, connections and contexts – and do it all with poetry.*

### Introduction

We started with the aim of writing some jingles to enrich *The Mathematics Book (TMB)* by adding more light-heartedness and strengthening some positive messages about mathematics [10].

*TMB* has been written principally for mathematically challenged adults, but teachers of mathematics and parents of school students may also find it useful. The book is a unique concept – a self-help mathematics text embedded in a multi-layered coffee table book. Photographs, graphics, colour and design are an integral part of its visual narrative. Its creation was guided by Paul Halmos' criteria for quality in mathematics – beauty, intricacy, neatness, elegance, satisfaction, appropriateness [2].

However, we soon realised the potential of poetry to contribute to the *TMB* narrative. Poetry would add a layer of mood and emotion that would be out of place if included in the main text. The use of word play and the vernacular would also add a casual note that might make the book contents more accessible to the reader.

We then embarked on a more ambitious project – to create a cycle of 14 poems, one for each chapter of *TMB*. The poems were written to:

- give a big picture perspective of mathematics
- introduce each chapter and give a feeling for its content
- emphasise key mathematics points and include some mnemonics
- present information that is accurate and relevant
- pack in as much mathematically significant content as possible
- collate all of the above in about 30 short lines for each poem.

### A Pop Song Format

Humans have an innate sense of order and seek pattern and rhythm in music, dance, art, film, writing and numerous other activities [1]. We respond instinctively to patterns and rhythms.

Certain poetry patterns such as those found in successful advertising jingles and popular music are memorable and can have a powerful emotional effect. We decided to go further and write songs that had a popular song format. Pop songs are ideal for communicating emotion in simple and accessible ways. But first, we needed to write song lyrics that would work as stand-alone poems in the book.

We have used two simple pop song formats [9]. Most of the poems have a verse-chorus form with verses (A) alternating with choruses (B). The verse is the main part of a song and roughly corresponds to a poetic stanza. The structure of the song/poem is usually ABABAB as in Poem 8, or BABABAB. The narrative poems are written in a simple verse form with no choruses.

The three-act structure is a model that is often used for storytelling such as those in films and plays [6]. This model was used in writing the poems, to ensure satisfying story development and resolution.

We have used a variety of verse lengths and rhyming patterns to create interest. For example, Poem 13 includes three verses that are in limerick form. Each poem takes a little over a minute to recite and when set to music it will become a three-minute song.

### The Poem Content

In its entirety, the poem cycle gives a comprehensive view of mathematics and each poem includes content from three main areas – the big picture, context and history, mathematical concepts. For example, Poem 8 is about the metric system and its content includes:

- *The big picture*  
Usefulness of mathematics ('Mathematics has done it again!') and the logic of the metric system
- *Context and history*  
The French Revolution, international collaboration and the Treaty of the Metre [7]
- *Mathematics*  
The metric system is based on powers of 10, metric prefixes and a feeling for some everyday units.

Our aim was to write song lyrics with a significant link to mathematics in either imagery or content. There are only a few examples of such songs, one being Tom Lehrer's *That's Mathematics* [5]. The original version of Lehrer's song was written as the theme for a children's television show and was later updated for an event celebrating the proof of Fermat's Last Theorem.

### Poem 8: MEASUREMENT

*During the French Revolution  
Many mathematicians combined  
To work out a measurement solution  
And the metre was defined  
Many countries later agreed  
Seventeen of them signed a deed.*

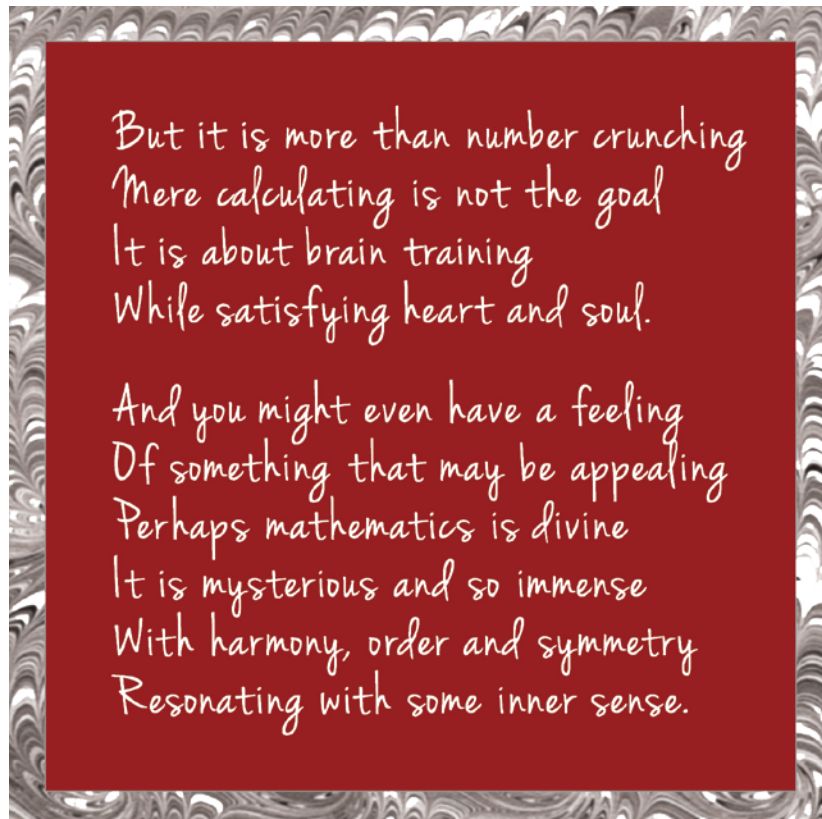
*It's such a clever metric system  
And it's based on powers of ten  
For measuring all things on earth  
Mathematics has done it again!*

*With kilo-, mega-, giga-, tera-  
The unit size increases  
With deci-, centi-, milli-, micro-  
The unit size decreases  
For any measurements big or small  
Twenty prefixes handle them all.*

*It's such an elegant metric system  
And it's based on powers of ten  
For measuring the universe  
Mathematics has done it again!*

*A kilo of water occupies a litre  
A tonne takes up a metre cubed  
One gram occupies a millilitre  
Or a centimetre cubed  
And a hundred metre sided square  
Has an area of one hectare*

*It's such a marvellous metric system  
And it's based on powers of ten  
For measuring things everyday  
Mathematics has done it again!*



**Figure 1:** An excerpt from Poem 14.  
 The typography uses the Jenna Sue font.

The succinctness of verse allows for compact ways of expressing the essence of a subject. For instance, the word count for Poem 8 is only 160 words, but factual and mathematical accuracy have been retained.

At an early stage in the writing process we developed a content matrix for the poem cycle. This helped us to track content, avoid duplication of ideas and ensure that the poems covered all significant points.

The visual impact of the poetry was an important consideration. Font and typography also communicate mood and emotion. The font selected for the poetry in *TMB* has a fluid and casual look and is based on the female designer's own handwriting [4].

### Educational Potential

Mathematics is often taught in ways that are more suited to the left-brain dominated minority who respond to the logical and the abstract. The arts are a means of communicating mathematics to the right-brained majority by providing opportunities for creativity and imagination [8].

Poetry is one avenue. Some concepts may be too abstract to follow when explained in traditional sentence form. However, when the explanations take the form of rhyming verse they may be more easily understood and remembered.

Humans are attracted to the novel, the unusual and the curious and our brains give priority to such information [12]. Packaging key mathematical ideas into pleasing rhythmic patterns may help to give those ideas priority for admission.

We constructed the poems so that individual verses could be used in a classroom situation in various ways – to set the scene for a lesson, to give a meaning, to provide a perspective. The chorus is the most memorable section of a pop song and is where a listener is most likely to join in the singing. Some choruses can be used as mnemonics. This is part of a chorus from *Poem 6: Algebra*.

Now '2b plus b' equals '3b'  
 And '2c plus c' equals '3c'  
 But '2b plus c' is not '3bc'  
 For '2b plus c' stays as '2b plus c'.

The poems present aspects of mathematics in a non-intimidating manner and the light-hearted nature of the verses may help to lessen mathematics anxiety. They also provide some answers to the perennial mathematics classroom question, ‘What is the point of learning this?’

### Conclusion

William James said:

*The union of the mathematician with the poet,  
fervour with measure, passion with correctness,  
this surely is the ideal [3].*

Mathematics and poetry are both about patterns. The language of mathematics enables the communication of a lot of information in a few symbols, while the language of poetry enables the communication of a lot of information in a few words.

Poetry has the power to engage our hearts and imagination and allows us to put ourselves into the mathematical picture. It can assist with sense-making in mathematics by helping us to connect with mathematical ideas and to see how the pieces fit together.

The next stage of the project will be to turn the poems into songs by composing music. These songs will later be the basis of music video clips such as those that were featured in the mathematics series, *Square One Television* [11]. We would welcome suggestions or any offers of assistance.

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