

Mathematics vs. Poetry

I am happy and excited that I can talk with great mathematicians and poets, good fantastic people. With greatest respect . D.B.

Danuta Blaszkak talks with **Wlodzimierz Kuperberg**

1. Why did you decide to become a mathematician?

I did not make this decision. In high school I liked solving mathematical problems, then I studied mathematics, and then, gradually, mathematics became my passion. I did not seem to have a choice.

2. You are a mathematician. For many people mathematics means numbers, fractions, bad grades, and other painful things. What does it mean to you?

What I find most attractive in mathematics is the element of ingenuity and elegance, when a problem that appears extremely difficult is solved in a flash of understanding as if a bright light has been turned on inside a dark room hiding a mystery. The pleasure of mathematical discovery can be compared to the pleasure of finding a beautiful gem well hidden from sight, and finding it not by chance, but by the pure power of mind. Often methods created for use in the process of mathematical discovery are just as valuable as, or even more valuable than, the discovery itself. In this sense mathematics is not much different from any other area of human creative activity, be it science, music or art. The only difference lies in the fact that mathematics deals with the idealized "universe" of axioms, precise notions, well-defined objects, definitions, and theorems, and with its own language that includes formulas, equations, graphs and diagrams (it is perhaps this formal, rigorous, artificial language that is the main cause of so much "pain" to many people who declare their aversion to or fear of mathematics), but it does not deal

not with human emotions, dreams, aspirations or desires, which most people can recognize and appreciate naturally.

3. Mathematical terms should be well-defined. Can you go to infinity using strict axioms and definitions?

The expression "go to infinity" is defined in mathematical analysis quite precisely. But the term "infinity" itself has many meanings in mathematics, each described and studied according to the usual principles of rigor and precision. One should realize, however, that just because a notion is well-defined, it does not mean that the notion is well understood, let alone completely understood. To the contrary: it is easy to define a new notion, but to understand it deeply can be quite difficult, and understanding it completely may even be impossible.

4. There are some fields of understanding where axioms and definitions don't work. While a mathematical term has exactly one meaning matching the definition, poetic metaphors are read with all the possible meanings. What do you think about the metaphorical description of the world? Does poetry complete math formulas? Is poetry more general (better?) while leading to understanding of infinity?

Metaphorical descriptions of the world are many, and they differ from each other significantly. They aim to affect our interpretation of the world and our feelings about it, but not to describe the world itself. Poetry does not compete with mathematics or other sciences in studying the physical world. Poetry deals with, and appeals to, the human mind, its emotions, dreams, relations with others, etc. Poetry will not help you with computing the trajectory of a comet, but may help you express your feelings when you see one in a dream. Poetry will not define infinity, but may describe your elation or your feeling of being overwhelmed while looking at the midnight sky filled with unimaginably many, unimaginably distant stars.

5. Somebody told me great mathematicians are poets. Do you agree with that?

Both poet and mathematician seek truth and beauty, though of a different kind. Both poet and mathematician create things, though of a different nature, and both dig deep in their minds in their creative acts. In this sense mathematician and poet are alike. I would say that, because of these similarities, it is possible for a great mathematician to be a poet too, but I would also say that most of them are not, unless one counts beautiful, significant mathematical creations as a kind of poetry.

6. Can you give me some examples of applying mathematics in art?

The connection between mathematics and music has been proclaimed so often, that it became an old truism already in antiquity (see, for example, http://en.wikipedia.org/wiki/Music_and_mathematics). Architecture is an obvious place where mathematics and art connect. I cannot give you any first-hand examples of such applications, however. I would say instead that mathematics, at a certain level, IS ITSELF a kind of art.

7. Can you find numbers in poetry?

Yes, but only if you look for them there. In poetry, I believe, you can find anything you want or expect to find.

8. What do you think watching stars on the sky at night? Would you describe it using mathematics and poetry?

The analytical part of my brain thinks about the difference between what stars appear to be (tiny specks of light arranged in constellations or crowded together in lumps) and what they really are (immensely huge balls of nuclear fire incredibly far

from each other). But the other part just enjoys the feeling of "infinite" space, the "friendly" twinkles from far away, their quietness and tranquility... Mathematics has its say and so would poetry, if I only were a poet.

9. Have you ever tried to describe dreams?

I know my own dreams only. A story told about a dream is not the same as the dream. One can easily describe an event in reality, but not a dream, at least not well enough to make another person see the same things and feel the same way as seen and felt while dreaming. Because a dream is not at all like any event in reality. Perhaps in the future one will be able to record the images and sounds of a dream by decoding one's own brain waves emitted in sleep and turning them into a "video", but that alone will tell us very little about the emotions of the dreamer. I suppose everything can be described with words, but it takes a true artist to be able to describe something as unreal as a dream.

10. What do you think about the metaphorical description of the world in the Bible or Qur'an or Tora? Didn't God use the axioms or definitions for His message?

I cannot assume that these descriptions were intended to be metaphorical. My limited knowledge about these writings prevents me from voicing my opinion on them.

Music and mathematics - Wikipedia, the free encyclopedia
en.wikipedia.org

Music theorists often use mathematics to understand music. Indeed, mathematics is "the basis of sound" and sound itself "in its musical aspects... exhibits a remarkable array of number properties", simply ...

Mathematics vs. Poetry

Danuta Błaszak talks with Włodzimierz Holsztyński

1. Why did you decide to become a mathematician?

I didn't. I simply was.

2. You are a mathematician. For many people mathematic means numbers, fractions, bad grades, and other painful things. What does it mean to you?

The Art of Thinking.

3. Mathematical terms should be well-defined. Can you go to infinity using strict axioms and definitions?

Mathematical language grasps infinity--several aspects of it--formally. This does not mean that we control infinity. On the contrary, infinity is mostly unruly. It is a source of excitement, beauty and profoundness. The main role of infinity is to simplify the complex finite situations by stressing their most important features. (Infinity, like many other good ideas, can be also abused to produce a low quality research, which misuses infinity to complicate things for no good reason).

4. There are some fields of understanding where axioms and definitions don't work. While a mathematical term has exactly one meaning matching the definition, poetic metaphors are read with all the possible meanings. What do you think about the metaphorical description of the world? Does poetry complete math formulas? Is poetry more general (better?) while leading to understanding of infinity?

It is not true that mathematical terms have exactly one meaning. They may have several seemingly different meanings (interpretations). Actually, they always do or else it is not mathematics. In poetry, haiku is like this.

In my opinion poetry does not deal with infinity, not seriously. It only brings infinity to your mind in a vague way. Poetry considers infinity only on the emotional level. When a

poem includes also certain intellectual analysis of infinity then it goes beyond poetry. If it does so well then so much better. Most of the intellectual poems are poor both as poems and as an intellectual exercise; they tend to be muddy, and snobbish or preachy.

It's not the goal of poetry to describe the whole world (be it in a metaphoric or in any other way). That's physics in the case of physical world, and, say, sociology in the case of the human world. A poem may use the notion of the world as a pretext to do poetry. The main goal of such a poem will be to create an artistic text. A single poem may study just one or two aspects of the world. Different poems may contradict each other. Even a single poem may include contradictions. Poetry may occasionally provide a mnemonic, or it may confirm what we already know, or may open our eyes on this or that, but it is not a way to study the world, to build knowledge about the world, to discover new truths. When a poem does so then it goes beyond poetry.

5. Somebody told me great mathematicians are poets. Do you agree with that?

They are so within mathematics. Otherwise, no, not necessarily. I don't know even a single instance of an outstanding mathematician who at the same time would be a strong poet (one song writer is known to the public also as a mathematician but only because he was a popular artist; without his songs he would not be publicly known as a mathematician).

6. Can you give me some examples of applying mathematics in art?

- Mathematics contributes to the art via technology, which uses mathematics. Occasionally, mathematics provides artists with new techniques.
- Projective geometry has contributed to progress in architecture and paintings (the theory of perspective). One can even claim the opposite direction: the architecture and the theory of painting have provided a stimulus to develop projective geometry.

- Salvador Dali and M.C.Escher used geometric transformations and symmetry groups in their paintings.
- Mathematical elements may appear in art or poems. Durer featured a magic square in at least one of his painting. There is a poem which features an integer or two in each of its lines-- this has worked as artistic means (like rhyme, metaphor, etc).
- The world of mathematics, like any domain of human activity, provides inspiration and material for poetry and art.

7. Can you find numbers in poetry?

Literary style can be studied statistically, in terms of numbers: the average length of words, lines, phrases, ...; the frequency of certain sounds or grammatical elements, etc.

Poems may feature numbers. For instance, Chinese around the eight century used the "ten thousand miles" phrase. I know of one poem only which used integers both intensively and artistically.

8. What do you think watching stars on the sky at night? Would you describe it using mathematics and poetry?

One could.

Most every poet has the night sky and stars in some of their poems.

Celestial Mechanics is one of the classical fields of mathematics. It's a difficult one. Several top mathematicians from different times have obtained outstanding results. Deep. Nevertheless this research field is wide open to the new generations of great mathematicians.

When at night I see stars straight above my head but not in the lower parts of the sky, due to pollution, then I feel claustrophobic. *)

9. Have you ever tried to describe dreams?

It's common among poets. Several of my poems involve

dreams or different stages of being asleep.

10. What do you think about the metaphorical description of the world in the Bible or Qur'an or Tora? Didn't God use the axioms or definitions for His message?

Unfortunately, I am not an expert on Bible nor Qur'an nor Tora.

Note:

*) In order to reach me the light ray from a star above the head has to cross a shorter distance through the Earth atmosphere than in the case of a star lower above the horizon.



It's our pleasure and honor to invite to this book
David Jou from Barcelona, Catalonia, Spain

David Jou
UNIVERS
Infinity

You denied me, infinity,
you annihilated me under mounds of indifferent light,
you bewildered me with vertiginous emptiness,
you frightened me with the silence of dead stars,
you grew endlessly in all the telescopes,
and we knew you continued beyond everyone's gaze,
beyond any longing fantasy of desire and any mental
dare.

But now we hear another tune:
if you weren't as big as you are we couldn't be,
the fire of the stars wouldn't have known how to cook
us.

Our price is infinity,
maternal, paternal, coldly condescending,
nailed to the soul in the form of nostalgia,
a weight too heavy to resist,
mind you, not of emptiness
but of not knowing how to name our dark body
with enough light to match the many stars.

Brothers of the infinite but nailed to death,
without knowing how to accept the finite nature of time
nor how to fill life with infinitude,
under mounds of indifferent light,
under vertiginous emptiness,
under the silence of dead stars,
but knowing that they are a price that we are unable to
value.

Mathematics vs. Poetry

Danuta Blaszak talks with David Jou

1. Why did you decide to become a mathematician?

I wanted to study literature, but I also enjoyed physics. I thought that it would be easier to go back from physics to literature than from literature to physics, so eventually, in front of my hesitation, I decided to study physics, which combines the observation of nature with the mathematical analysis.

2. You are a mathematician. For many people mathematic means numbers, fractions, bad grades, and other painful things. What does it mean to you?

It means one of the underlying forms of order of the universe, may be the subtler one. It means, thus, a way towards the heart of reality, and a way towards beauty.

3. Mathematical terms should be well-defined. Can you go to infinity using strict axioms and definitions?

Mathematics tries to grasp infinity, as theology tries to grasp God. Axioms and dogms may be a part of the logical way, but it seems that these realities -infinity, God- really transcend our understanding.

4. There are some fields of understanding where axioms and definitions don't work. While a mathematical term has exactly one meaning matching the definition, poetic metaphors are read with all the possible meanings. What do you think about the metaphorical description of the world? Does poetry complete math formulas? Is poetry more general (better?) while leading to understanding of infinity?

I enjoy the contrast between univocal meaning in science and multiplicity of meanings and suggestions in poetry. In our

communication with nature, both ways may be useful and exciting. Reason and emotion, each of them are a source of enjoyment. In some occasions, reason and emotion, analysis and intuition, go along the same way, and this produces wonderful moments.

5. Somebody told me great mathematicians are poets. Do you agree with that?

In some sense, yes. They look for beauty and understanding through language. Of course, language, in their case, is a very symbolic and strictly codified language. Poets invent words and open new ways to the sensibility. This is also true for mathematicians. Creating new mathematical techniques is creating new languages which make more accessible and intuitive some aspects of reality.

6. Can you give me some examples of applying mathematics in art?

The golden ratio is found in many classical paintings and buildings. It has been a source of proportions with much esthetical appeal. Since I am a Catalan poet, I cannot forget the architect Antoni Gaudí, and the painter Salvador Dalí, both of them Catalan: Gaudí combined mathematics - paraboloids, hyperboloids- with structures found in biology - trees, branches, snail to prove their buildings with surprising structures; Salvador Dalí was passionate of physics and mathematics, which are present in many of his paintings, especially after the Second World War. Their last passion in life was catastrophe theory. Nuclear physics, relativity theory, molecular biology, were sources of inspiration for him.

7. Can you find numbers in poetry?

Numbers are as present in poetry as in music. In fact, in poetry they are more explicit: the number of syllables, the rhythm of accents... One can also find numbers as organizing the books -for instance, the number of poems of the several sections of some books reflect symmetries at the level of the concept of the book. Finally, one may find poems on numbers.

There are several poems on the number pi -myself, I have a poem on the number pi which has some tree hundred verses, about the history and the esthetical and philosophical appeal of this fascinating number.

>

> 8. What do you think watching stars on the sky at night? Would you describe it using mathematics and poetry?

>

>

I have described it in both ways. Using mathematics, I have woked on some cosmological problems, or astrophysical problems-; astronomy makes a very precise use of numbers. But numbers do not describe your feelings, they do not convey the admiration, the fear, or other sensations you may feel when looking at the stars.

9. Have you ever tried to describe dreams?

In my poems I have described several dreams. Dreaming I have had access to the first verses of a considerable number of my poems. To not forget this magic verses, which give the thrust of the whole poem, I write these verses in some paper and I go back to the bed.

10. What do you think about the metaphorical description of the world in the Bible or Qur'an or Tora? Didn't God use the axioms or definitions for His message?

I consider the first chapter of the Genesis as an exciting combination of poetry and numerology: an essay to organize the world and time. Today, we see it as poetry, but when it was written for the first time, this description was one of the most accurate scientific description of the structure of the reality. But, of course, science changes when your means to observe it change. In any case, the intention of the writer was to celebrate the greatness and power and existence of God, rather than to give the scientific details about nature.