

Polyaesthetics and mathematical poetry

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Abstract

Polyaesthetics is a term I use in connection with my artwork since it embraces three different aesthetics; the aesthetics of verbal language, the aesthetics of visual language, and the aesthetics of mathematical language. My artwork can be regarded as a blend of “Visual Poetry” and “Mathematical Poetry.” This paper focuses primarily upon the mathematical and verbal aspects of my work, touching only briefly upon the visual aspects. It provides several examples to illustrate the process I use to create polyaesthetic digital art based upon equations commonly encountered in physics and mathematics.

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‘Visual poetry’ [1] is a contemporary genre that has struggled to find a satisfactory definition for itself. There are several different schools of thought on the matter, and many different facets to its manifestation. In my own work, apart from certain obvious textual elements, the visual poetry aspects find themselves in the same company with the visual poetic expressions used by the twentieth century Belgian surrealist painter Rene Magritte [2]. However, whereas Magritte primarily uses the juxtaposition of different visual concepts within the context of his paintings as his expression of visual metaphor, I use the juxtaposition of *visual*, *verbal*, and *mathematical* concepts as my expression of polyaesthetic metaphor. The context for the art work is created by the cognition of the imagery as a whole as well as providing the conceptual tension for the metaphorical ideas.

My definition of ‘mathematical poetry’ is that it is an artistic expression arising from performing mathematical operations on words or images as if they were numbers. One may find this baffling at first because it appears as though we mathematical poets are confused about knowing the difference of the states of quality versus quantity. However, it is through the fusion of this dichotomy that mathematical metaphor is spawned.

Concerning the subject of mathematics, for me it has two important facets: one being that it is a language, and the other being that it is a system. Ordinarily, we take a concept and explicitly relate it to other concepts using the language of words. For example, if we want to know how far a train has moved along its tracks for the duration of 2 hours when we know it has traveled with an average speed of 150 miles per hour, then the subject of physics provides us with a relationship we can use to solve this problem. Furthermore, that relationship matches our experience. It says that the distance an object travels is equal to the average speed at which it is traveling multiplied by how long it has traveled. We can express this as a mathematical equation by writing the familiar $d = vt$. Notice that we have now expressed a single concept in two different ways, one using words and

the other using symbols. Once we have the problem formulated using equations we are often able to use mathematics (i.e. the rules from an underlying formal system) to solve it.

As an artist I search for emotional and spiritual relationships which I can then compare implicitly to physical relationships that have already been formulated by scientists. Everyone has heard metaphorical statements related to physics such as: the power of love, the force of oppression, or the negative energy of jealousy. I find that fusing the language of math and the laws of physics together with verbal and visual art provides a wonderfully rich mixture of aesthetics. I call this fusion polyaesthetics.

My mathematical poems focus on using mathematical equations as a language for art. While pure mathematics has no expression of metaphor, it does provide us with a structure for expressing metaphor. My interest in mathematical poetry lies in creating an artistic expression within the context of a mathematical equation. As with all metaphor, I gather concepts from different sources and place them within a single context which figuratively points to the metaphor. As an example of metaphor we could state, "The eternal sleep of death awaits us". Here we are comparing the attributes of death to the attributes of sleep. We may also put the metaphor in terms of a "target domain" and a "source domain". The "target domain" is the subject to which attributes are ascribed. The "source domain" is the subject from which the attributes are borrowed. "Source domain" and "target domain" are terms I borrowed from the cognitive scientist George Lakoff [3]. In this nomenclature, metaphors are named using the convention "target IS source", with the word "is" always capitalized; in this notation, the metaphor discussed above would state that "death IS sleep". The semantic tension created in a metaphor is due to the dissimilarities of the target and the source within the structure of the metaphor. What may be considered new and different in my use of metaphor is that in many cases the target and source reside within a mathematical equation to be manipulated by mathematical operations with the *intent of connotation*. In my work the equal sign "=" is substituted for the "IS" in the metaphoric structure.

My personal view is that almost all mathematic applications rely on using equations with the intent similar to simile. The variables in the equation are compared explicitly with the result for uses in denotation. For example, in the case of an application of Newton's second law $F = ma$, or Force equals Mass times Acceleration, we are comparing the variables m (Mass) and a (Acceleration) explicitly to F (Force).

I can now make a mathematical poem based on the latter example by expressing the Force of 'yesterday's freedom' as being equal to 'a lush clover patch' multiplied by 'the swelling sweet summer breeze traversing the morning'. We can then put this in the form of a mathematical equation as; Yesterday's freedom = (a lush clover patch)(the swelling sweet summer breeze traversing the morning). In other words, I set the Force to 'Yesterday's Freedom', the mass to 'a lush clover patch', and I accelerated the mass by 'the swelling sweet summer breeze traversing the morning'. All of these phrases relate back to the original equation from physics $F = ma$. I want to emphasize that I was very careful when I made my choice for acceleration so that the phrase is evocative of the mathematical description of acceleration as defined by physics. Acceleration is the change in velocity of an object per unit of elapsed time during that acceleration. Here, the change in velocity is implied by 'swelling' and the change in time is implied by 'traversing'.



Figure 1. Kaz Maslanka, “Golden fear” digital artwork, 2004 (© Kaz Maslanka).

Concerning the visual elements that are incorporated into my polyaesthetic artworks; I try to focus on choosing images that will provide visual counterpoint to the metaphorical idea I am trying to express. I strive to be cognizant of visual meaning by using established visual languages based on my understanding of contemporary art. For example, in my work “Golden Fear” (see figure 1), I started with a ‘hellish’ visual metaphor by using a photo that I composed of a burning fire. With the help of digital tools, I then used my own sensitivities to transform the photo adding a dirty, off-gold abstract feel to it that intensified the notions of fear and beauty. My work “Golden Fear” also serves as an example of a mathematical metaphor because it is based on a continued fraction that represents the Golden ratio, but here the word fear has been substituted for the number ‘1’. In this manner, two ideas - fear and the number ‘1’ - are being identified within the context of this artistic expression. Moreover, fear and the number ‘1’ conflate to yield a new idea: the idea of a “Golden fear”. In addition, the continued fraction in “Golden Fear” can be viewed as an expression that is related to some force of nature that is both beautiful and feared. This is no accident. The Golden ratio has been linked with many natural phenomena. My interest in composing this piece was in creating a statement where the visual, verbal, and mathematical languages were combined to yield the single metaphorical idea, “Golden fear”.

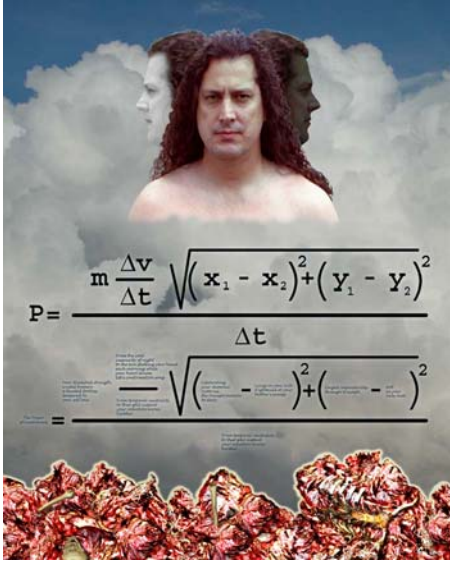


Figure 2. Kaz Maslanka, “The power of confidence” digital artwork, 2000 (© Kaz Maslanka).

My artwork, “The power of confidence” (see figure 2) is an example where an equation from physics serves as a paradigm of a physical phenomena, which is transformed into a metaphorical vehicle which contains my mathematical poem. The equation from physics I chose was one for calculating power. It states that the power used to move an object is equal to the energy expended (work) per unit change in time.

The corresponding mathematical equation I used was $P = \frac{E}{\Delta t}$. I then substituted for the variable ‘E’ to obtain a better understanding of the relationships involved. Energy (work) can be expressed as force exerted over a distance. Furthermore, that force can be expressed as the mass of the object multiplied by its acceleration. Its acceleration can be expressed as its change in velocity (delta v) per unit change in time (delta t). Lastly, its distance travelled in two dimensions can be expressed as the square root of the sum of the squares of its change in position along two distinct axes. Thus we have:

$$P = \frac{m \frac{\Delta v}{\Delta t} \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}}{\Delta t}$$

Now I want to explain how I transformed this equation for power to give it a verbal context for use in my piece “The power of confidence”. Let me first introduce the term “virtual object” to replace the physical object that is normally the ‘object’ of such equations from physics. The virtual object can be thought of as an emotional or psychological object present in mathematical poetry that utilizes equations from physics as a paradigm to ‘carry’ the poem.

In my poem “The power of confidence” the mass of my virtual object is “*Your diamond strength crystal bravery, a faceted fortress tempered by your self love*” The change in velocity ‘delta v’ of my virtual object is “*From the cold insecurity of night*”

to the sun shaking your hand each morning while your heart drums life's confirmation song.” The change in time 'delta t' that affects my virtual object is “*From temporal neutrality to that split instant your intuition knows . . . eureka!*” The `conceptual' distance my virtual object will traverse will be determined by the difference between x_1 and x_2 in the first dimension where x_1 is “*Celebrating your demonic victories, the transformation to deity*” and x_2 is “*Lying in your crib, frightened of your mother's sneeze*” and by the difference between y_1 and y_2 in the second dimension where y_1 is “*Forged impenetrable through triumph*” and y_2 is “*Soft as your baby butt*”. Therefore, I make the substitutions:

m = Your diamond strength crystal bravery, a faceted fortress tempered by your self love

Δv = From the cold insecurity of night to the sun shaking your hand each morning while your heart drums life's confirmation song

Δt = From temporal neutrality to that split instant your intuition knows . . . eureka!

x_1 = Celebrating your demonic victories, the transformation to deity

x_2 = Lying in your crib, frightened of your mother's sneeze

y_1 = Forged impenetrable through triumph

and

y_2 = Soft as your baby butt

into the equation for power P .

These substitutions give rise to the verbal form of my mathematical poem. For now we can see that our virtual object's mass of “Your diamond strength crystal bravery, a faceted fortress tempered by your self love” is being accelerated between the concepts of “the cold insecurity of night” and “the sun shaking your hand each morning while your heart drums life's confirmation song”, and that this is happening from the moment of “temporal neutrality” to the moment of “that split instant your intuition knows . . . eureka!” while moving over the distance determined by the difference of the concepts of “Celebrating your demonic victories, the transformation to deity” and “Lying in your crib, frightened of your mother's sneeze” in one dimension and the difference of the concepts of “Forged impenetrable through triumph” and “Soft as your baby butt” in the other dimension. Moreover, all of the above is occurring between the moments of “temporal neutrality” and “that split instant your intuition knows . . . eureka!” (see figure 3)

Native American tribe. In the view of the Zia people, the Zia sun symbol symbolizes the spiritually sacred number four. The Zia believe that many important foundations of nature occur in “fours”. They see four periods of the day morning, noon, evening, and night as well as the four cardinal directions north, south, east, and west. They also recognize four periods of life, childhood, the teen years, adulthood, and old age. The number four even extends into their belief in four sacred obligations of a man: he must develop a strong body, a clear mind, a pure spirit, and a devotion to the welfare of his people.

In conclusion, polyaesthetics connects the aesthetics of math, poetry and art by using each discipline in one context (the art work itself) to yield a rich aesthetic experience. Furthermore mathematical poetry exemplifies the use of mathematical equations beyond science. One's expression can range from the didactic to the spiritual to the aesthetics of “art for art sake”. The natural beauty of mathematics provides a limitless foundation to reflect the structure of the natural world and resonate within the personal structure of our belief systems and presents a source of inspiration to manifest a new-found synergetic aesthetic.

References

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