This Equation is Art

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Abstract

In this paper I advance the notion that the depiction of a mathematical equation becomes a piece of art if its representation carries a *narrative resonance* that allows it to communicate with the viewer. Following Mullins [1] there is greater potential for an equation of importance and depth to carry this resonance well beyond any real world object that it may represent.

Introduction: equations as visual objects

The landmark article *Truth + Beauty*, by Mullins [1], questioned why the beauty of mathematical equations had not been harnessed more widely as a form of contemporary art. He was having a show in London at the time, of photographs of typeset equations from many branches of mathematics and physics. As iconic pairings, Truth and Beauty, Mathematics and Art seem to have a linked duality. Indeed I admit an affinity for the practice of writing equations in, and as, art for more than 30 years. Mullins outlined in his article an intriguing approach: he not only photographed typeset equations, but used an intriguing wall text to spin a narrative around his images, enough to draw the viewer in to take a closer look. I would call this approach, one of bringing a *narrative resonance* to communicate with the viewer, possibly from different standpoints, but all with the endpoint of bringing in an audience.

In compiling his new 2008 book *Formulas for Now*, Hans Ulrich Obrist [2] invited artists, writers, architects, mathematicians and scientists each to contribute an equation for the twenty-first century. The resulting book with an equation per page is a spectacular readable array with a hardcover trapping of pink binding against 1950's-green covers. Respondents took many approaches, from the humorous to the deadpan formulaic. The contributor's name appears at the top of their page, similar in function to named wall texts in museum exhibitions. This work really catalogues how contemporary minds think—'and is testament to the vital role that formulas play in contemporary culture', [2]. The depicted equations are treated as visual 'design' objects. Some of these equation objects surprise: Gerhard Richter provides a page from his *Atlas* containing diagrams reminiscent of graph theory; Tacita Dean's working method text equation is written *chaos / chance = process*, while more mathematically, Benoît Mandelbrot gives his landmark iterative equation $z \rightarrow z^2 + c$ that is used to generate the fractal Mandelbrot Set .

In his quest for mathematical beauty that is art, Mullins [1] noted that 'A piece of mathematics must give some important or original insight to be beautiful'. He quotes the example of Euler's famous formula

$$e^{i\pi} + 1 = 0$$

which links together some of the major symbols of mathematics and complex number theory. Mullins suggests that an equation such as this is visually more powerful than geometric figures and models so

often associated with beauty and mathematical art by the general public. Thus, it is the equation that is art, rather than a model of it. On a more geometric scale, for example, the mathematical representation of complex numbers in the plane is more artful than an image of the plane itself. But how is the bridge between mathematics and art crossed? I would suggest that the key lies in *how* the equations are represented.

Transcendence

The abstract thinking that configures Euler's equation seems to be given an encouraging push along in Obrist [2] by virtue of the fact that it is handwritten, and, has Mandelbrot's signature appended. Suddenly there is a narrative guiding our thinking, and capturing our interest: did Mandelbrot really write this in this hand? There is an intrigue around viewing the handwritten notes of a mastermind. The final handwritten image, as a piece of art, has transcended its original mathematical role in this context. The white handwriting on the dark 'blackboard' page seems quite resonant of the viewer's own schoolroom histories.

The notion of 'transcendence' seems key to understanding why other types of texts, markings, lines and scribbles have the capacity to intrigue and move people, even though their original function is not based on logical deduction. The potential take-up of images or text by contemporary culture is not based around logical reasoning and deduction (as is exhibited by the pictorial role of equations), but rather by a resonance with a subculture. Transcendent images and text communicate to subcultures. Successful images get in there, are threshed about, and are taken up and used. Perhaps this is why the highly resonant, but entirely illogical and scribbled, residue texts, installations, films and acts by Joseph Beuys have infiltrated twentieth century art history (a subculture), forced their way to the top, and remained there, still highly influential. The related term 'trace', which Ingold [3] describes as 'any enduring mark left in or on a solid surface by a continuous movement' seems to give appropriate visual narrative resonance for the viewer. For example, a standard musical score is simply a text of notes on staves that show the performer which notes to *play*. After a violin score has been annotated by the performing violinist, as illustrated by Ingold [3], it seems to be a transcended document of *performance* carrying 'bowings and markings'. This *equation* is art.

Another contributor to Obrist's book of formulas is the Swiss artist Bernar Venet, who offers *Related to 'The Homology (Co-Homology) Sequence of the Pair (X,A)',* 2000. In this work, Venet carefully paints a museum wall fluorescent yellow, and then overpaints the field with precisely extracted equations from a research paper on Algebraic Topology. McEvilley [4] felt that 'the viewer is left with the experience—delight in colours, amusement at chance resemblances and a confrontation with an essential unknowability'. This is because the audience cannot read research-level mathematics.

We have noted here that interpretation, handwriting and authorship can assist with the process of visually representing equations as art. Indeed, to become art, an equation, like any object in the world, must be transcendent—and refer to our understandings of culture beyond its original mathematical function. Venet, for example, has specifically chosen mathematical texts to block viewer understanding of the depicted image, rather than appealing to the viewer to bring their own histories of similar texts. This narrative remains 'confrontational' rather than resonant, and following McEvilley's advice we are left to delight in the colours.

References

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[2] H. U. Obrist, *Formulas for Now*, Thames and Hudson: London. 2008.
[3] T. Ingold, *Lines: A Brief History*, Routledge: London. 2007.
[4] T. McEvilley, *Monochrome Math*, Art in America, April 2003, pp. 108-113. 2003