

A Successful Belgian Art & Math Exhibition with Workshops

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Abstract

This short paper gives an account to the Bridges community of 'Art&Math', a concept, an exhibition with workshops, that was successfully organized in early 2014 at the Université libre de Bruxelles (ULB). More than 50 contemporary artists, mainly non-mathematician Belgians, and almost 20 historic precursors of 'mathart' all had artworks on display with a mathematical content, realized in many art forms and media. About half of these works were specially developed for the event to illustrate more than 20 mathematical themes that were addressed providing a humorous, playful and didactic experience to some 4800 visitors of all ages, including classes of schoolchildren and high school pupils with their teachers, besides students from the ULB itself and beyond.

For the record in the Bridges community (some participants in described event are members of), among the documents presenting special experiments in the broadcasting of art and math relationships, we liked to share an account of an unusual mathart event organized in Belgium, highlighting some texts that were used (though their contents are familiar to many Bridges participants majoring in mathematics), specific intentions and resulting accomplishments. Interested readers are invited to browse through the material from the book/catalog [1] (in French) made available at the conference.

Preliminary Philosophical Thoughts

(This section is a translation of the Preface [1] by prof. Baudouin Decharneux, director of the ULB department of philosophy and religious sciences, member of the Royal Academy of Belgium)

“The study of mathematics (μάθημα, science, knowledge) was an integral part of man's philosophical journey until the split between what we now call exact and human sciences. We well know the importance held by mathematics for Pythagoras or Plato who conceptualized numbers in as many ways as structuring the real (interlinking of objects and phenomena), penetrating the logic governing the fate of the Being (expressing with finesse the mobility of phenomena and bodies), and expressing the invariant character of the Being-in-oneself and the mobility of the existences (the relationship between the One and the multiple).

It is this relationship between unity and multiplicity (e.g. between a river and its different shapes through the seasons) and the precision of predictions (e.g. position of a celestial body at a given time in the future) that primarily retain our attention. One will note-but the comment has become anecdotal for

exact sciences-that until the Renaissance numbers make one also think on the allegorical level (numerology or arithmology). And so, numbers pertained both to the fields of mathematics and symbolics.

Mathematics hence, invites us to think according to its capacity at expressing in a constructed and specific language ideas as complex as unity, invariant, multiplicity, fate, cyclicity, etc. Mathematics will thus progressively be considered as the methodology par excellence allowing at the theoretical level the establishment of the validity and the veracity of certain types of reasoning (e.g. physics or logics).

When we think of the word *cosmos* as it was thought of by the Greeks, it appears that penetrating the world order, establishing mathematical relationships between celestial bodies, feeling an aesthetic emotion when contemplating the unity of the Whole, stems from a same reading of the world, a same relationship to the “real”. After Galileo, combined to the systematization of the experimentation, mathematics imposed itself as the proper language of scientific thought. It must thus be noted that the direct link that mathematics maintains with art suggests straightaway that mathematics also fosters creativity and contemplation. So, on a philosophical level one cannot dissociate mathematics, elegance and emotion. The elegance of a mathematical proof has long been considered a corollary, even a manifestation, of its veracity. There still is something relevant in this aesthetic judgment.

If mathematics as an abstract discipline retained the attention of philosophers (e.g. Nicolas de Cues, Kant, Husserl), one will note that applied mathematics were also the roots of many original reflections and speculations. One thinks for example of Platonic geometry, Philon's architecture, Augustine music, Ibn Sina's soul healing, Leibniz's probabilities, Descartes' automatons. And so it is we can state that they authorize rigorous thought (science) and make one think (creativity).”

Art & Math as a Statement, a Manifesto

Impossible marriage? Or rather, a long and secret love affair between two worlds too often neglected because needing an initiation reputed to be demanding, a peer-to-peer dialog between a work of art and a mathematical argument, a witness to the deep unity of human thinking. A meeting of geometrical and finesse spirits.

First a dream! Unlock this exclusion mechanism using playful keys respecting the necessary rigor for young minds naturally equipped for receiving them with joy is the central objective of this exhibit and its associated workshops. Reconciling two essential poles of human culture, creating an encounter of visual arts and mathematics, displaying the connivance between artists and mathematicians for all to see.

Then it became a project open to the world. With the pleasure of transmitting, the faith in a Culture freed from divisions, fixed opinions, hierarchies. A desire to free spirits from confinement in narrow identities, reduced to a few stereotypes, to predetermined conventional futures. As any project allowing to pull down a few fences of thought, Art & Math is an act of emancipation.



Figure 1 : Views exhibition and visits

The Discovery Exhibition

Strangely close, artists' and mathematicians' research revealed much more than technical influences: mutual inspiration, parallel progress, connivance. More than 50 contemporary, mainly non-mathematician artists intentionally showed-or-hided a small bit of the mathematical universe, in a hundred visual artworks, from literature to comic books to digital arts, via drawing, painting, sculpture, photography, installations, works of origami, etc. More than 20 math themes structured the expo and accompanying texts revealed the true nature of mathematics carried by those works. They elaborated and contextualized the diverse elements present: from logic to numbers, spaces to structures, polyhedra to the infinite. All these elements were joyfully and playfully celebrated.

The patient baring of the convergence between both approaches, artistic and mathematical, revealed a large amount of common ground. Curiosity, taste for research, experimentation, accuracy, etc. Imagination and questioning talents, precision and rigor at work, passion. A same attraction for beauty and the mystery of discovering, a same taste for freedom, a same imagination unite two worlds. Something to sweep happily one's conventional wisdom on arts as on mathematics! The exhibition hosted by ULB Culture, was a crossroad for pupils and teachers, senior groups, families, friends, artists, scientists, philosophers, and others all to meet. Their looks and smiles provided all the meaning to the project itself. The crisscross bouncing through the space of numerous similarities and ever echoing of new hidden hints being uncovered constituted a rare delight for both thinking guides and excited participants!

Themes addressed on the explanatory panels:

Infinites, impossibles, folding axioms, spirals, helices, helicoids, Fibonacci numbers, Phi, a star among numbers, Pi, a famous number, writing of numbers, Latin & magic squares, famous series, counting the possibilities, geometrical forms, polyhedra and duality, symmetries, tessellations and dissections, the Pythagorean theorem, transformations and deformations, other worlds (non-Euclidian geometries), strange “planes” other two-dimensional worlds, famous graphs, graphs and routes, logic and paradoxes, mathematics' different languages, set theory: from void to infinity. But neither computer art nor music.

The Workshops to Learning

On the occasion of the exhibition, a choice of 2.5 hour planned theme afternoon sessions was offered by non-mathematician artists for selection to primary and secondary schools. The participants first enjoyed a half hour specific visit aimed at explaining the *mise en abyme* (each within the other) of art and mathematics, two worlds too rarely associated yet rich in numerous and exciting declinations of creativity and rigor. The visits were often run by the professor (almost only mathematician and artist), curator and inspirer of the exhibition and first author of the present paper, or her assistants, including the second author, organizing the workshops. Then, these school audiences went to the workshop space to tackle open assignments with great freedom and limited hints from the supportive artist aided by facilitators, either advanced university students or scientific staff. It was essential for the success of these operations that the groups be accompanied by their regular teachers who also gave a preparatory session before and a wrap-up one after the events in synergy with the concepts chosen related to the specific level and interests or running educational programs at school (Mathematics, French, Visual arts).

Subjects offered in the workshops:

From Islamic tessellations to original discoveries (by Jean-Marc Castera); Free figures with POLY-UNIVERSE (by János SAXON Szasz); Polyhedra through the centuries (by Alain Gotcheiner); Play the computer alla Vasarely (by Frederic Moreels); Games on Vasarely and Delahaut themes (by Turtlewings and Athénée Léon Blum); Initiation to origami (by Jacques Mouvet); “TIT ATA” and “TIT ATA TRI”

(colored tessellation games by Anita Drisch); Playing with words according to OULIPO – Raymond Queneau (by Jean-Michel Pochet); Labyrinth-maze duality/Atomium-soccerball, open books on duality of polyhedra/2D, 3D geometry and approaching 4D with Zometool (by Samuel Verbiese).



Figure 2 : *Almost randomly chosen by second author [2] among many artists and artworks:*

- a.** *Work of Marguerite Wibo : nesting of affine Euclidian and projective geometries, a world's first, math content inspired by GDM,*
- b.** *GDM explaining an origami by Michiko Van de Velde in front of a theme explanatory panel and a set of other origami by architect Jacques Mouvet, math inspired by GDM*
- c.** *workshops by invited participants (Bridges authors) Jean-Marc Castéra (France) and János SAXON Szász (Hungary) [...and a discrete hello from Jacques Beck],*
- d.** *first mathematical artwork by rabbit lover artist Lionel Vinche: 'The Keeper of Fibonacci's Rabbits', after the encounter with cats freak GDM hinting at a Fibonacci construction,*
- e.** *huge wooden 'super jackpot' sculpture by retired art school director Robert Kayser, after famous work by Raymond Queneau '100.000 milliards de poèmes',*
- f.** *'Wave' by Jean-Yves Vossius: find an error and an intruder ... after 800% enlargement of the on-line paper! Math formulas idea inspired by GDM.*

Acknowledgments

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References

- [1] Gisèle De Meur, *Art&Math, un concept, une expo*, 180°éditions, 2014, www.180editions.com
- [2] Gisèle de Meur, many artists: <http://gatito.be/expo/artistes-exposants/>
- [3] Gisèle De Meur, personal artwork in the Bridges Exhibit Catalog Baltimore 2015, <http://gallery.bridgesmathart.org/exhibitions/2015-bridges-conference/>