Échos de la pensée: reconciling art and maths

Louis-Hadrien Robert and Paul Turner

Reflecting on our personal experience making the multimedia installation Échos de la pensée*, we discuss how the demands of artistic creation are not necessarily aligned with those of mathematical communication and attempt to dig a little into the reasons why.*

> *I once saw a wonderful painting of an owl by Picasso. Today, I suppose, an artist might just stuff the bird and put it in a case… But Picasso's owl is an account of a human being looking at an owl, which is a lot more interesting than a preserved specimen.*
> – David Hockney [4]

> *Créer le navire ce n'est point tisser les toiles, forger les clous, lire les astres, mais bien donner le goût de la mer…*
> – Antoine de Saint-Exupéry [5]

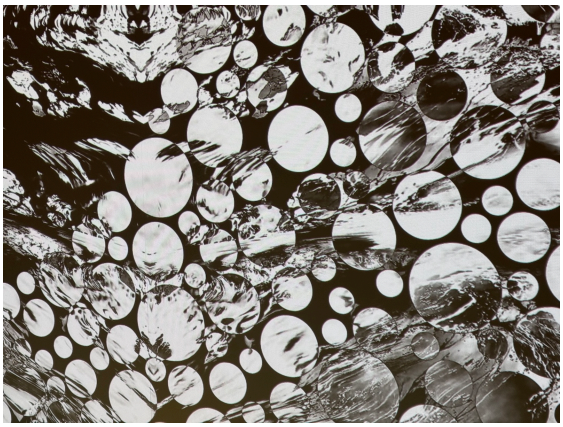
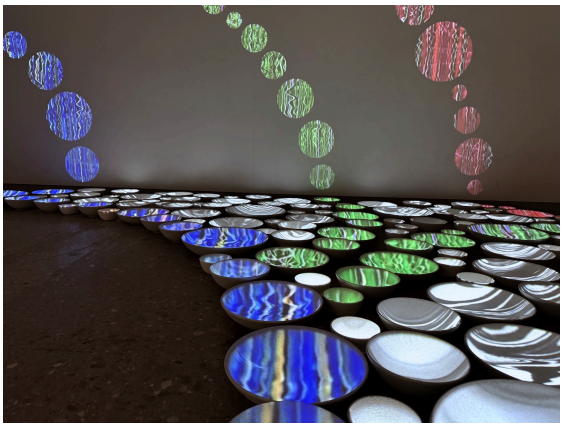
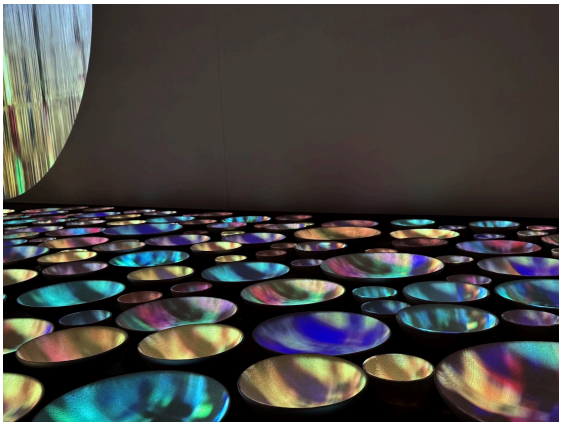
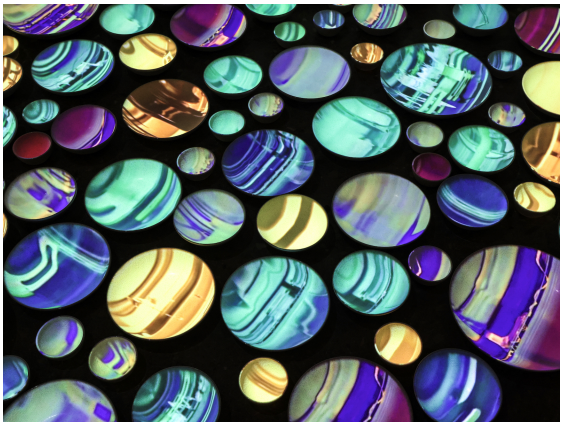
1 Being pulled two ways

In our guise as the Robert Turner Collective, we were recently commissioned to make an artwork related to mathematics for which the initial tacit expectations were that the piece would communicate something (hopefully accurate) about the maths and simultaneously "count" as art. In isolation, neither of these criteria presents a problem: on the one hand, the fruits of many art residencies in scientific institutions testify to the fact that artists can be inspired by science with results that definitely "count" as art; on the other, the many wonderful examples of visualising mathematics, both in a research context and in outreach, show us that the scientific community can produce extraordinary visual material. However, do the former tell us something accurate about the science? Would the latter hold the attention of the art-going public? The waters quickly get murky. In this article we hope to shed some light on these questions by looking at our own experience of creating a multimedia installation, *Échos de la pensée*, born out of discussions with Fields Medallist Maryna Viazovska, Professor at EPFL (Switzerland), celebrated for her work on sphere packings.

Échos de la pensée at EPFL Pavilions, 2025. (Photo © Julien Gremaud)

The expectations referred to above are intentionally a little vague, and it is not useful here to get distracted by attempting to define "art" or "mathematics." We ask the reader to accept that, in general, art is what professional artists do, mathematics is what professional mathematicians do, and members of each community are more or less able to identify what "counts."

As our project advanced, we found increasing unease marrying our artistic needs with mathematical accuracy and, in fact, these two imperatives were pulling us in different, mutually exclusive directions. There was indeed something to reconcile. If one cannot see a reconciliation – which is essentially the point we reached – it is reasonable to ask why not? Any answer too general will lead to probable failure, so we firmly base our discussion on a very personal perspective.

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2 Description of *Échos de la pensée*

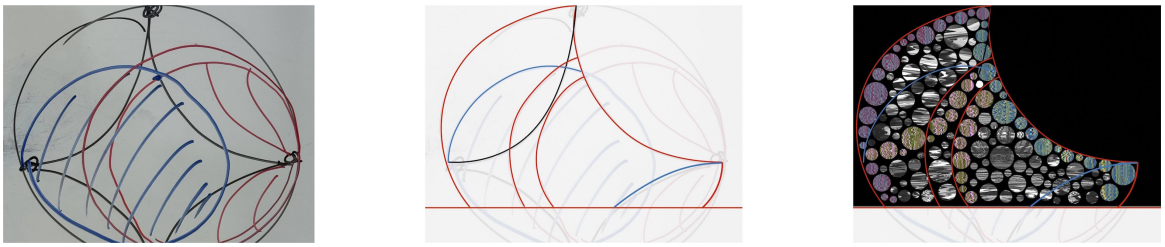
The installation, which was on display at EPFL Pavilions as part of the *Shapes* exhibition[1] consisted of a two-zoned projection canvas: one on the wall and the other extending to the floor, occupying the same space as the viewer. The floor zone was populated with 145 bowls of different sizes creating a non-standard projection surface. Only the interior of the bowls was used for projection. The scale was modest – each zone fitting in a $4\,\mathrm{m} \times 2\,\mathrm{m}$ rectangle – as we wanted to retain an intimacy between viewer and physical elements. A 15-minute loop of moving images comprising five different three-minute segments was projected onto these surfaces.

Based only on the pictures shown here, it is perhaps already clear that to a large degree we sacrificed any mathematical accuracy for the art. There are some residue hints of the mathematics – the bowl placement is an obvious nod in the direction of circle packings and the global motif is based on a sketch of the hyperbolic plane taken from Viazovska's whiteboard – however we did not engage with mathematical communication as such.

The intention was to represent the human side of mathematical research, capturing the different emotions or states of mind involved in the process. Outside the mathematical community, there is a commonly held view that maths is cold and emotionless, and we wanted to confront this. Our aim was to portray a quest for truth guided by beauty and simplicity, whose practitioners are constantly confronting the unknown, driven by curiosity and influenced by a multitude of very human qualities. In an era in which the emergence of AI models appears to be removing our monopoly on complex thinking and deep reasoning, we believe it is all the more important to encourage this kind of reflection.

Focusing on the human side to mathematical research also naturally raises the eternal question of the nature of mathematical objects themselves. We use the two projection zones of *Échos de la pensée* to play with the dual nature of mathematical concepts. On the one hand, one can consider that they have a proper intrinsic existence in an abstract Platonic world – represented by the curved

[1] The exhibition *Shapes: Patterns in Art and Science* was open at EPFL Pavilions, Lausanne in 2025, from 17 January to 9 March. Under the scientific direction of Marc Troyanov, Hugo Parlier and Michael Herbst, it aimed to open a window to the richness of the natural and artificial patterns that surround us. https://epfl-pavilions.ch/en/exhibitions/shapes



From white-board sketch (Maryna Viazovska) to underlying motif. (© Robert Turner Collective)

surfaces and colourful, organic patterns in the bowls. On the other hand, since these objects are defined by humans, they are bound to our own understanding and this "shadow" is illustrated by the projection on the flat wall, where the images echo, but remain distinct from, those of the floor.

3 Discussion

Why did we make the choices we made and sacrifice mathematical accuracy for artistic expression? The quoted passage from David Hockney at the top of this article makes the point that Picasso has attentively observed the owl and is responding to it, projecting his own reaction and feelings onto his painting. Indeed, transmission of emotional content is a key goal. Perhaps an artwork carries some further intent or background message, a political statement for example, but whatever lies behind, the artist aims to elicit some response beyond the surface-level experience of simply taking in visual information. Pressing this point and sticking with Hockney, in [2] (also [1]) there is a photo of the artist painting "The Road to Thwing, Late Spring," in which one sees a landscape that is pretty, but that might be walked through without any particular second thought. The emerging painting, however, calls out to the viewer in a very powerful way. Hockney is sharing *his* experience. This added intensity in which an artist projects their thoughts, prejudices, fears and so on, onto the thing being portrayed is the secret sauce. The situation is a little less evident in more abstract art, but the principle remains the same.

How does one go about adding this intangible ingredient? There is no straightforward answer. In general, there is no escaping hard work which relies on intuition based on previous experience and learnt models, uses a good deal of trial and error, and requires a keen sense of self-criticism (not to mention a large rubbish bin at the ready). Nothing here is awfully surprising, but it leads us to a hint of the difficulty we are facing: throwing every method, technique or trick at the problem requires a high degree of flexibility. If one starts with some science or mathematics to communicate, the constraints are simply too restrictive. Conversely, if one starts with an artistic idea, it becomes nearly impossible to hammer it back into some realistic science context without sacrificing to an unreasonable degree the original idea. In a nutshell: the required "artistic licence" takes us too far from the accuracy one needs to communicate the science. Scientific understanding and artistic understanding both enrich us, and ideally we could appreciate both in equal measure, but they do nonetheless seem rather different to us. Indeed, the didactic impulse of mathematical explanation and the creative impulse of artistic practice pull in different directions.

Photo © Julien Gremaud.

For *Échos de la pensée* we did not really reconcile the two, but a way forward quickly emerged. During our interviews we did not observe any modular forms nor any Eisenstein series, nor for that matter any sphere packings. Rather, we were observing Maryna Viazovska – her enthusiasm, her passion for a part of a proof coming together beautifully, her curiosity and so on. Most readers

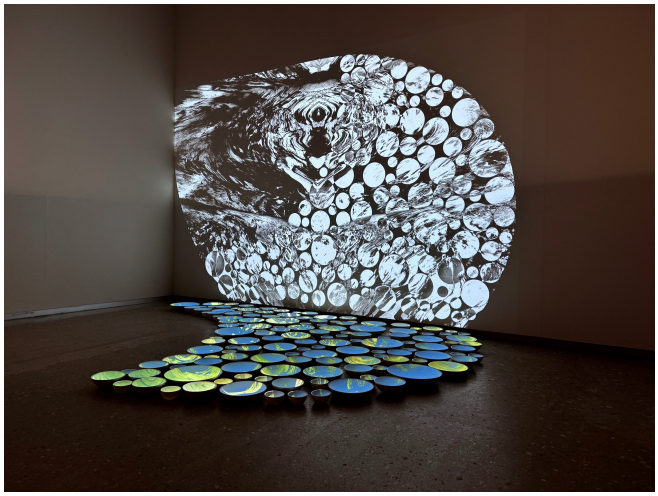


Photo © Robert Turner Collective.

of this article will be mathematicians, who will know from their own experience that notions such as curiosity, simplicity and beauty, frustration, inspiration, confronting the unknown… are all aspects of mathematical research. Yet a great many people will be surprised to learn this is how mathematics is seen by its practitioners. To us, this message seemed extremely important, in fact, more so than conveying any particular snippet of mathematics, and we felt equipped to address it artistically.

We should not over-generalise, and let us stress once again that we are writing from personal experience, but the points made are groping towards a more general understanding and so it is interesting to examine where this leaves us.

What, for example, can we make of the many artistic residencies at scientific institutions? Parachuting an artist into a lab, with intended output some art "related to" the science, is quite a fashionable thing. There is no doubt that science inspires some wonderful art: talk to an artist about infinity or 24-dimensional space, and you will see a fascination and openness that is very refreshing and discussions may well lead to great artistic output. On the other hand, rather little will be added to science, mathematics or its communication. It is not the point of art to do so, but it can be a frustrating source of misunderstanding between the two communities. The language used to describe what is being done can be misleading and the artist who says "I am investigating/exploring/interrogating the infinite" can come across as painfully naive to scientific ears. In fact, the artist will have little to nothing to say about infinity itself, but this misses the main point: the artist can hold up a mirror and say something interesting about our psychological or emotional response to being confronted with the infinite. We may learn something about ourselves from this kind of approach and, more importantly, others may simply be inspired by the art and later drawn to the actual science.

What about math/art? Recently, George Hart [3] wrote a very thought-provoking piece discussing a particular class of artworks, math/art, produced almost entirely by mathematicians. His interesting and frank analysis leads him to celebrate math/art wholeheartedly, yet – noticing a disinterest from the art establishment – he concludes that much of it "is not truly *fine art*." It is of course difficult to pinpoint why not. Suggesting there may be missing secret sauce is not exactly providing the kind of analysis needed. Nonetheless, if the art community are looking out for the kind of "added value" we are referring to above and not finding it, this might explain some of their reticence.

4 Reconciliation

While our approach to *Échos de la pensée* avoided conflict between our two worlds rather than reconciling them, the experience convinced us of the mutual benefit of engagement between maths and art in all its forms. Mathematics has a well-known image problem and this stems in large part from its intangible nature: one cannot feel or smell mathematics, nor can it be directly seen or heard. Traditional maths outreach which attempts to overcome these difficulties is evidently not touching everyone and the question of how to reach new audiences remains ever present. Any approach that targets new groups – however unusual – should be taken seriously. Art lovers, for example, may include people not usually found among the audiences of maths outreach. Art can hold up a mirror to the mathematical community and offer an inspiring window to others. If, as a mathematician, you find yourself talking to an artist, you may be best advised to detach your mathematical content from your enthusiasm and try to communicate the latter: allowing an artist to represent your passion may turn out to be a very valuable and effective contribution.

There was one final irony to *Échos de la pensée*. The last day of the exhibition came and, having agonised about how to include sphere packings in a more explicit way in our work (and then not doing so), we had to pack the bowls into storage crates … efficiently.

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The Robert Turner Collective is an artistic collaboration between Louis-Hadrien Robert and Paul Turner, founded in 2019. Louis-Hadrien lives and works in Clermont-Ferrand (France); Paul lives and works in Geneva (Switzerland). Both are also mathematicians – at the Université Clermont Auvergne and the Université de Genève, respectively.

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