Magritte Meets Matisse Meets Mathematics

Demian Nahuel Goos
Universidad Nacional de Rosario, Argentina; demian@fceia.unr.edu.ar

Abstract

In this manuscript the author presents a collection of pieces of artworks he created inspired by the surrealist work of René Magritte and the drawing with scissors technique by Henri Matisse. It exhibits a novel way of visualizing mathematical beauty in order to make this concept accessible to a broader audience. The mathematical background that underlies this work together with its history and relevance are described.

Introduction

We mathematicians frequently talk about the beauty of our discipline–about the emotions that simple but powerful equations, surprisingly multifaceted theorems or unquestionably elegant proofs arouse deep in our hearts. Bertrand Russell already stated that *mathematics, rightly viewed, not only possesses truth but also supreme, sublimely pure beauty, capable of a stern perfection such as only the greatest art can show*, and Paul Erdös compared the beauty of natural numbers with Beethoven's 9th symphony. He assured that–just like with Beethoven's symphony–if you did not see their beauty, no one could show it to you.

If this happens to be true, it is an issue of undeniable priotity, for it would mean that most people remain irremediably unaware of what mathematicians are so passionate about. The profound implications hidden behind most equations are invisible to the naked eye. Furthermore, it is impossible to the layman to fully comprehend the far reaching power of a theorem due to its stern and austere nature, and the training needed to follow an elegant proof from end to end only adds more difficulties. Needless to say, the feelings that arise in a mathematician with the epiphanic realization of how to complete a beautiful proof are even more difficult to describe.

However, it cannot be the final answer that a layperson is on his own when trying to perceive mathematical beauty. It is the duty of the mathematical community to make it visible, and this work is an attempt to do so. For there are numerous ways to express an idea or a feeling and mathematics has the particularity to be a universal language that has clear connections to most such disciplines.

In this work I present a connection between several mathematical concepts, paradoxes and ideas with the work of René Magritte. It is a bridge that uses the surrealistic language of said artist to express this particular mathematical idea. The first section will briefly present some key ideas of the opus of the Belgian artist. The following section presents the artwork together with the mathematical background, after which the subsequent section briefly comments some technical details which are strongly connected to the work of the French Henry Matisse and what it represents.

René Magritte

René Magritte was a Belgian surrealist who is famous for creating scenes which appear to be natural at first glance. However, a more detailed analysis reveals that most of them have an absurd nature, contradictory elements or unsettling figures. Unlike other surrealists, who created undoubtably odd landscapes, Magritte presents treacherous scenes making us feel as if we found ourselves in a familiar situation. He plays with perception and our senses, questioning to what extent we should believe in our sense experience.

One of his most celebrated works is *La Trahison des Images*, in which he shows a pipe together with the label *Ceci n'est pas une pipe.–This is not a pipe.* Several other such works have been created by Magritte, depicting other ordinary objects like apples, hats or candles, and labeling these objects with words that do not describe them at all. Magritte studies the connection between a real object, its visual depiction and its name. The underlying question is whether we can describe our reality with pictures and words if we do not even know what reality actually means, and although this is a rather philosophical question, it possesses a direct link to one of the fundamental questions of mathematical philosophy: Can we describe our reality with mathematics? Why is this even possible? What are the limitations of mathematics in this context?

So a question that could arise is: if Magritte had worked in mathematics, what would have caught his interest? What would he have found appealing? What would he have worked on? The answer seems to be quite straight forward if we take a look at his work. Scenes with a paradoxical background, situations that challenge our intuition and statements that seem to contradict the very nature of his paintings are recurrent elements in his work. We see a rider passing in front of trees and behind them at the same time, a bowler hat suspended in the air as if an invisible man was wearing it or a person who sees his own back at a mirror. So mathematical paradoxes, not only true antinomies, but also particularly those true counterintuitive statements that challenge our minds could be precisely what Magritte would have loved about mathematics.

The Artwork

Figure 1: *The Treachery of Infinity*

When talking about paradoxes and counterintuitive results, the mathematical idea of infinity usually provides us with many usefull examples. Since we do not encounter infinity in our real world nor in everyday life, it is hard to experience infinity. We cannot perceive infinity with our senses, which is why this mathematical concept causes difficulties in our minds. Figure 1 shows a monkey together with the text *This is not a poet*. It is a reference to the infinite monkey theorem, which states that if a monkey randomly types symbols on a typewriter during an unlimited amount of time, he will type the whole work of William Shakespear with probability one, and thus will become a poet.

Figure 2: *The Treachery of Geometry*

Originally axioms were thought to be self-evident statements, which give no room for doubt about their validity. However, the formalist approach, the one the general mathematical community works with today, stripped them of this natural plausibility. We now work now with an axiom because of what it implies, and so many modern axioms are not intuitive any longer. One of the most discussed examples of this is the *axiom of choice*, which inescapably leads to more counterintuitive results. Figure 2 shows an apple together with the text: *This is not an apple. It's two.* It refers to one such counterintuitive result, the Banach-Tarski paradox, which is probably the most famous and discussed one. The theorem states that one can take one three-dimentional solid ball and partition it in a finite amount of parts, which when reassembling them form two copies of the original ball.

Figure 3: *The Treachery of Set Theory*

There is one important difference between counterintuitive results–paradoxes which challenge our intuition or results that are not true in our real world but are in both cases valid in mathematical terms–and true antinomies, which bring along a certain doom and hopelessness. They unveil that the system we are working with is wrong and thus worthless. Figure 3 shows a pipe together with the text: *This is not a barber.* It is a reference to Russell's paradox, probably one of the most prominent antinomies in mathematics, which is frequently described as the problem, whether a barber, who only shaves those who do not shave themselves, should shave himself or not. The pipe alludes to its discoverer, Bertrand Russell.

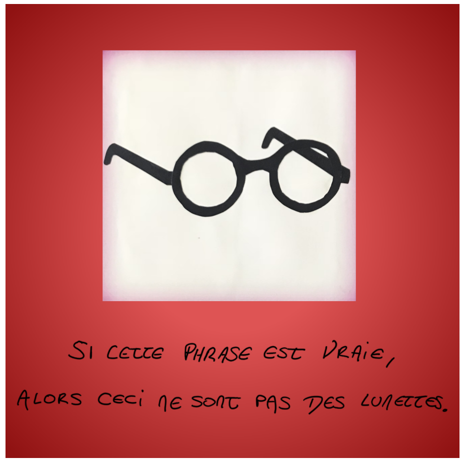

Figure 4: *The Treachery of Logic*

Finally, there are those results which not only are counterintuitive and difficult to understand to the layman, but also drastically change the way we understand mathematics. They may not change the everyday life of most mathematicians, but answer fundamental philosophical questions in unexpected ways. Figure 4 shows some glasses together with the text: *If this statement is true, then these are no glasses.* The statement is a version of the Curry paradox, a statement which unlike Russell's paradox creates an antinomy without the need of set theory. The glasses are a reference to Kurt Gödel, who used a similar statement in his proof of the first incompleteness theorem.

Technical Details

Each piece of this series consists of two parts. The first one is a 35cm × 35cm coloured PVC foam board with a text written on it, similar to the style of Magritte's works. Slightly above the middle, we find the second part, a 20cm × 20cm area that depicts an everyday object cut from paper board in different colours.

This technique of cutting paper board was inspired by the late work of Henry Matisse, who *drew with scissors*–as he called it–when he was no longer able to draw with pencils and colours. Instead of yielding up to his fate he reinvented himself and given that this is precisely the spirit found in most mathematicians who faced fateful results and paradoxes, I considered this technique to be the most fitting for my work. In his day, Matisse's own cut-outs were received with scepticism, they were harshly criticized and accused of being childish, which is why I would expect nothing less of my comparatively amateur work. Nevertheless, there is one more significant reason which lead me to use this technique: The realism in Magritte's work is an important element of his paintings and a vital part of the message he is trying to convey. However, here the mathematical limitations to represent reality are protrayed, which is reflected in the abstract, non-realistic respresentations with paper board. One may say that more details would distract from the main message.

Summary and Conclusions

This group of works is part of a series of twelve that I am working on, all of which refer to a paradox, an antinomy, or the life of a mathematician.

The connection with Magritte's work is clear. The ability of mathematics to create real-life applications of theoretical results is astonishing in the first place. It's power beyond any doubt. However, how can we pretend that mathematics describes our world and our reality if such pathological results are part of mathematics? What meaning and what value does the mathematical language have if it is not capable of escaping from such counterintuitive theorems?