

# MATHEMATICS AND ART

## SHORT VERSION

- The association of art and mathematics extends over many centuries and civilisations both at philosophical and practical levels. This lecture has to be selective!
- Platonic idealism and Pythagorean mysticism have had a lasting influence on Western art, especially in theories of proportion and the use of geometry.
- Until the 20<sup>th</sup> century mathematics was essentially a servant of the arts, rather than a subject for art.
- With the aim of achieving classic harmony, theories of proportion based on simple, numerical ratios (especially the 'golden mean') were used in painting sculpture and architecture- examples from ancient Greece, and Italian Renaissance – Piero della Francesca and 19<sup>th</sup> century France (Seurat).
- Ideal Geometric shapes were used as a tool to analyse form (Leonardo da Vinci et al).
- Using geometrical techniques, new theories of perspective projection were developed (Alberti, Brunelleschi, Piero della Francesca) giving artists a reliable method of accurately representing built form and space.
- These developments became the general practice in painting for the succeeding centuries, and were enshrined in academic teaching of the subject.

- However it was not until the 20<sup>th</sup> century that mathematics became itself the subject matter for art.
- The first abstract paintings (from 1911 on) often used geometric shapes – rectangle or circle – as the raw material for composition (examples Malevich, Mondrian and later Herbin, Nicholson). This was largely driven by a desire for purity of form, a need to concentrate on the basic essentials of composition.
- The Belgian artist Vantongerloo analysed Mondrian's paintings in mathematical terms to demonstrate their harmonic proportions. He then developed his own works using mathematical equations as their basis. Thus the works became the expression of the mathematical idea, and for the first time mathematics became in effect the subject.
- Vantongerloo's ideas strongly influenced Max Bill, Swiss artist and architect who became the founder of the 'Art Concret' group during the middle years of the century. This group tended to use mathematical reasoning and/or processes to generate their works – examples Bill, Lohse.
- I saw Max Bill's retrospective exhibitions in Paris in 1969, and found his ideas and work very inspiring. For many years I struggled to develop and clarify my own approach – which is that the mathematical idea should generate, and find its natural expression in, the finished painting. To close this talk I would like to show how this actually works, with examples from some of my paintings

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