George Hersey

Architecture and Geometry in the Age of the Baroque

Reviewed by James McQuillan

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With the recent publication of such works as Dalibor Vesely's *Architecture in the Age of Divided Representation: The Question of Creativity in the Shadow of Production* (2004) and Chikara Sasaki's *The Mathematical Thought of Descartes* (2005), we are able to access Renaissance and Baroque mathematics as never before. The earlier appearance of George L. Hersey's contribution to Baroque mathematics unfortunately could not avail of the material of such later contributions, and yet this is a major work that deserves attention. Prof. Hersey has organized his book not as a continuous history, but as a series of 'episodes', interweaving the mathematics, mainly geometrical, with their architectural applications in each episode, and admitting that 'another author might write with equal justification about different episodes' (p. 4). This review will describe his episodes and then discuss what such 'different episodes' might be.

The first chapter, titled 'Introduction', leads on to a presentation of proportion, namely the well-known arithmetical, geometrical and harmonic series. In doing so, Hersey misses out completely when he reaches 'harmonic', as he fails to refer to the philosophical foundations of this topic. This omission reflects on the author's general attitude to his material, the failure to consider ancient and later philosophy to lay bare the primary considerations of such a topic as harmonics, which was for Plato the understanding of growth and order in the world or cosmos. The mimetic importance of harmonics is briefly touched upon when he refers fleetingly to the possibility of cosmic projection in Kepler's *Harmonices mundi*, but the discussion of mimesis, for Hans Johann Gadamer the most important and ancient of all theories of art, is then avoided – 'mimesis' does not appear in the index. Therefore while Hersey provides a wealth of detailed examples of mathematical lore and their applications, the fundamental issues of interpretation and meaning are in the main

absent. With this important observation ever in mind, the remainder of the book will be set forth in order to survey its scope.

The second chapter is 'Frozen Music', discussing Vincenzo Galileo, Kepler and Kircher, and then on to François-Nicolas (not François) Blondel, ending with a modern analysis of Bernini's baldacchino in St. Peter's. There is no reference to music as a Liberal Art, where such relationships were studied for centuries. This chapter, like those that follow, is very well furnished with cuts and coloured diagrams. One application of dissonance from the hand of Piranesi in the 1770s, is 'conscious or unconscious', thus vitiating the inclusion of this base of a candelabra on the architect's tomb (p. 39-40).

'The Light of Unseen Worlds' is the title of chapter three, where he reaches the conclusion that the stacked domes of the Baroque were modeled on telescopes and microscopes. This I find extremely hard to accept, for the simple reason that such instruments were the preserve of a small elite, and therefore meaningless to the general audience of Baroque society. Boullée's cenotaph (not tomb) of Newton appears near the end, and surely this should not be included in a book with Baroque in the title. Hersey never establishes a chronological framework for the Baroque, so such inclusions – this is not the only one – are awkward and puzzling for the average reader. So is Michelangelo, surely a precursor of Baroque, not really a Mannerist? While there is no objection in referring to the great Florentine as Hersey does, such a distinction should be made, so that the reader is warned accordingly.

The fourth chapter, 'Cubices rationes' depends on Kepler's *Harmonices mundi*, and treats of 'tiling' – the fitting together of polygonal and other shapes, flat and solid. He ends up discussing 'Archimedean solids' presumably found in Kepler's text, but we are never certain where such a concept originated, or what exactly are their special attributes beyond the statement that 'the angles of each face . . . are uniform'. But why are they 'Archimedean'?

'Symmetries', the title of the fifth chapter, identifies the modern usage of the term with an expression of Bernini's regarding an altar in Paris in a conversation with the Queen Mother. The following discussion is based on reflective symmetries, and this chapter is perhaps the weakest in the book, as we are never sure if the Baroque believed in such a concept that we now accept, to any general extent. An illustration of Boullée's Palais de Justice is included here but there seems no reference to it in the text.

Conic sections form the basis of the sixth chapter, 'Stretched Circles and Squeezed Spheres'. Its first section is labeled 'The Beauties of Distortion'. This title begs definition – what is beauty? Perhaps a clear consideration of this central and ancient concept would have rescued Prof. Hersey from his aversion to philosophy and provided some manifest conclusions for the reader. The only reference to trammels and drawing machines is found on p. 136, Blondel's

compass for drawing an ellipse from his *Cours*. Blondel and many others were fond of such instruments; I will come back to this issue later.

Chapter seven is called 'Projection', a central territory of Renaissance mathematics and art. Here Hersey's episodic arrangements falter, for he discusses Desargues before Renaissance perspective, which would have made a sensible introduction. Another sensible move would have been to discuss the Theorem of Pappus as an introduction to projective geometry, so no doubt the beginner will have great difficulty in negotiating the presentation of Desargues's projection and his perspectival method. It might be added that since the very few such as Pascal and Philippe de la Hire were able to understand Desargues, his impact on actual building was minimal. Hersey uses Guarino Guarini's method of calculating the area of a circle as an exercise to illustrate projective geometry (pp. 172-173), but it is assuredly not the case that Guarini would have intended this, as his grasp of projective geometry was elusive, extending to the Theorem of Pappus only. To the general reader this exercise will seem perplexing and there is little justification for its inclusion in an otherwise clear treatment of the main material elsewhere. The alleged relationship of regular polygonal circumferences to the outline of gunpowder fortification on pp. 177-178 cannot be at all sustained: the development of Baroque military architecture derived from considerations of angular bastions with connecting curtain walls, and were at first provided to existing cities. That regular layouts were common on fresh sites is undeniable but even so, the precise profiles of solid geometry do not coincide with the particulars of such fortifications as working defenses.

The penultimate chapter is on "Epicycles', deals with circles centered on a greater circle's circumference, and broken symmetry. Hersey struggles with providing some meaning to epicycles, but never refers to the Ptolemaic system that depended on 'saving the appearances' by recourse to such geometries, explicitly in the astronomy of Guarini. His statement, 'After all, rotundas were the earthly homes for the free-flying souls destined for the Heavens' (p. 186), is very amusing but theologically incorrect. The book ends with a chapter on Wright and Corbusier, with the important observation that modern architects cannot think as their forefathers did – computers just approximate what emerges from freehand sketches. Hersey is right of course: his book does illustrate many of the complex activities that accompanied earlier architectural design in so many ways.

So what is missing – what might different episodes address? First, there is the need for a concise treatment of mimesis, how ancient art up until the Enlightenment conceived of beauty as the embodiment of metaphysical and transcendent realities, which in mathematical terms was primarily achieved through harmonics and geometrical imagery of great variety. In dealing with the Baroque a more intensive treatment of light and sound is required – Guarini springs to mind as the great exponent of light at this period. Finally a full treatment of trammels and drawing instruments, such as the mesolabium

mentioned by Vitruvius and carried on by Blondel and others including Descartes, to achieve harmonic results, not to mention machines for entasis to full-sized columns, seems important to tie the various procedures together.

About the reviewer

James McQuillan is an architect and theoretician who spent a considerable time in practice spanning 1969 to 1982, which also saw periods in academia, acquiring an MA under Prof. Joseph Rykwert at the University of Essex, and spending a research year in Rome. In that period he was involved in conservation and leisure architecture as well as teaching at his old school of architecture in Dublin, and practising on his own account after 1978. In 1982 he returned to academia full-time, first by teaching in Arabia for four years and travelling in Europe. He completed his doctoral thesis on Guarini in 1991 at Cambridge under Dr. Dalibor Vesely, and has conducted an international career of teaching and research in architecture and the humanities until the present. He is currently B.Arch. Course Leader at the University of Botswana, in Gaborone.