Matthew A. Cohen

_Beyond Beauty: Reexamining Architectural Proportion through the Basilicas of San Lorenzo and Santo Spirito in Florence_

Venice: Marsilio, 2013, 304 pp., 130 illus. $45/€70, ISBN 9788831716437

Existing scholarship on the fifteenth-century Florentine church of San Lorenzo celebrates the church’s visual clarity and grounds that aesthetic assessment in proportions, drawing on the prevailing interpretive model that Rudolf Wittkower established in formative writings of the 1940s and 1950s. Setting out to understand these proportions through measured surveys of both San Lorenzo and Filippo Brunelleschi’s subsequent design of Santo Spirito, Matthew A. Cohen discovered a proportional system different from the one Wittkower had suggested. In this carefully argued study, Cohen sets forth intriguing new proposals regarding the chronology of San Lorenzo’s construction, its design attribution, and, more broadly, the period’s mathematical culture and the place of proportion in early fifteenth-century design.

By studying proportions, Cohen seeks to understand the intentions of the building’s designer. His proposal that these intentions might be found in the built fabric is particularly intriguing, given the scarcity of authors’ statements or autograph drawings for the period as alternative sources. Cohen’s methodological approach combines exacting examination of the building’s dimensions with consideration of contemporary written documentation, always with attention to the mathematical aspects of the architectural proportions. The jury for the James Ackerman Award for the History of Architecture signaled its approval of this methodology in awarding Cohen’s book the prize in 2012.²

A quest for rigorous analysis propels the study, and in the first of six chapters Cohen carefully defines his terms. He identifies an ambiguity in the modern use of the word _proportion_ that conflates qualitative aspects associated with beauty with aspects that are quantitative and associated with mathematical ratio. This differentiation is critical, since Cohen wants to situate proportion as an objective problem rather than an inherently subjective, aesthetic one resistant to logical assessment. While acknowledging that medieval and Renaissance architects associated certain positive qualities with proportions, Cohen urges the modern reader not to confuse those historical beliefs with our own, and he critiques Wittkower for insufficiently differentiating between the qualitative and quantitative aspects of proportion.

The next two chapters present the core dimensional analysis of San Lorenzo. Survey data from Santo Spirito provide points of comparison. Cohen begins his analysis in chapter 2 with the repeated unit of the nave arcade bay, the source of the interior’s orderly and rhythmic appearance. Following a careful delineation and justification of his method—from deciding where to measure to establishing criteria for assessing the dimensional data—he identifies a root-2 rectangle (with a width-to-height ratio of 1 to $\sqrt{2}$) as the basis for the building’s proportional system. Cohen’s effort to distinguish intentional from nonintentional proportions leads to extensive expositions of geometry, number, and arithmetic. He discusses the _trattati dell’abbaco_ (arithmetic schoolbooks) that were introduced to Florence in the fourteenth and fifteenth centuries as the vehicles by which medieval mathematical theories found a broader audience. Noting significant variations in the dimensions and the sculptural quality of the column capitals and entablature blocks in the nave, Cohen proposes two phases for construction of the nave arcades beginning midcentury, after Brunelleschi’s involvement.

Chapter 3 turns to the overall design of the basilica. A guiding order is much less readily apparent in plan, yet here, too, a root-2 rectangle proves a useful tool for analysis. Cohen finds that even in the absence of a regular grid organization, a conceptual modularity governs the whole. The bulk of the chapter painstakingly reconstructs possible scenarios for the design process on the basis of the dimensions found in the plan and applies the analytical method to the cross section of the nave. In appealing for “patience with fractions” (127), Cohen concedes a challenge that his text poses for the reader. He finds a unified proportional system and common dimensions that link the Old Sacristy and the basilica, suggesting they were conceived together as an integrated design, and thereby proposing a resolution to a long-standing scholarly conundrum. Acknowledging that the dimensional relationships his measurements reveal have been hidden from most observers, Cohen shifts to discussing the number symbolism of more readily discernible elements, such as the reliefs on the nave entablature blocks depicting the book of the Apocalypse (Revelation). While authorship is not his main concern, he suggests that these are not likely to have been part of Brunelleschi’s initial design.

In chapter 4, Cohen employs his metrical analysis to cast new light on unanswered questions regarding the relationship of the fifteenth-century church to its Romanesque precursor and Brunelleschi’s role as designer of San Lorenzo. A 1418 request for land to enlarge the old basilica, made by the church’s prior, Matteo Dolfini, proves a key document as it references specific dimensions for the new construction. While earlier scholars have considered this, Cohen’s survey dimensions provide the basis for a new reconstruction of the old basilica. Cohen invokes an important argument, first proposed by Howard Burns and more recently developed by Marvin Trachtenberg, that initial design decisions may restrict the choices of a project’s subsequent designers.³ Countering the claim made by late fifteenth-century biographer Antonio Manetti that upon inheriting the project Brunelleschi abandoned all previous work, Cohen credits Dolfini with establishing the proportional systems for the basilica and the Old Sacristy. He restricts Brunelleschi’s design role to updating the visual language of the building through his use of materials and classicizing forms, and thereby establishing the building’s distinctive style.

Chapter 5 explores the influence of medieval models on San Lorenzo and Santo Spirito. Reflecting his own architectural training, Cohen characterizes design as a process of reworking precedents, and he...
expands the range of possible prototypes to include not only Tuscan and Roman sources but also Gothic-style models from Lombardy. His discussion of Lombard models, including Milan Cathedral, San Petronio, Bologna, and especially Santa Maria del Carmine, Pavia, is particularly strong and provides an important contribution to a growing scholarly awareness of regional influences beyond Florence and Tuscany. The second part of the chapter turns to the model of Santa Maria del Fiore in Florence. Cohen’s new survey of the cathedral reveals key dimensions whose patterns imply a proportional system, one that could have provided the “seed numbers” for the proportions used in both San Lorenzo and Santo Spirito (239). Yet, encountering significant irregularities, he also explores a different approach to precision in the medieval period and further investigates number theory in the following chapter.

Chapter 6 returns to the book’s opening premise and to several aspects of Wittkower’s arguments. Where Wittkower found stark period distinctions, Cohen, in emphasizing both a medieval interest in number and an enduring Renaissance reliance on geometry, instead identifies continuities. The development of fractional arithmetic was, nevertheless, a Renaissance innovation, marking a significant turn toward greater precision. Cohen engages recent scholarship, including that of Alfred Crosby and Lon Shelby, that recognizes the significance of applied mathematics as a point of intersection between theoreticians and practitioners, important both for advancing mathematical knowledge and for introducing complexity into architectural design.

Cohen seeks a broad understanding of the mathematical qualities of San Lorenzo’s design. Medieval and Renaissance observers believed, he argues, that proportional systems could visually symbolize order and represent both strength and beauty. He advances an important proposal for the place of proportions in an age before structural calculations. Understood to convey structural stability, proportional systems played a rhetorical rather than functional role, serving as “invisible bearers of meaning and objects of belief” (275). Cohen then dwells further on his own methodology, which draws upon the disciplines of archaeology, art history, and architectural history. He situates his observation-based research as a rebuttal to Wittkower’s inattention to the object. This would be a strong conclusion to the book, but Cohen includes an epilogue in which he reiterates his argument against connecting proportional systems and beauty, and he rebukes modern observers for maintaining an illogical, mystical belief in the aesthetic qualities of proportions.

True to the book’s title, Cohen’s primary subject is architectural proportion. The author presumes a readership already well informed about San Lorenzo’s history or ready to set aside many attendant issues, such as the construction chronology and the role of patronage. The book’s structure requires patience, since, particularly with his meticulous analysis of dimensions, Cohen often reveals the direction of his arguments only at their conclusion. Not all aspects of the book equal the rigor of its metrical analysis. Cohen makes plain his reliance on earlier scholarship, but the historiographical context is not always clear; a lack of publication dates in the notes challenges the reader’s ability to understand how the scholarly arguments have unfolded. A four-page appendix offers measured drawings of San Lorenzo and the Old Sacristy; however, the website offering Cohen’s comprehensive survey results for San Lorenzo and Santo Spirito is inaccessible due to an outdated URL.

Cohen’s rigorous and focused study suggests both the merits and the challenges of his methodology. His close attention to medieval and Renaissance mathematics brings added nuance to traditional periodization, contributes to a growing area of research, and offers important insights into the role of mathematics in early Renaissance design while enhancing our understanding of major monuments in the history of Florentine architecture.

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Notes
2. The James Ackerman Award, administered by the Centro Internazionale di Studi di Architettura Andrea Palladio, recognizes excellence in the first book by a young scholar in architectural history.

Roberto Gargiani
Concrete from Archeology to Invention 1700–1769: The Renaissance of Pozzolana and Roman Construction Techniques
Lausanne, Switzerland: École Polytechnique Fédérale de Lausanne (distributed by Routledge), 2013, 404 pp., 300 color and 16 b/w illus. $115.95, ISBN 978294022643

This book is part of a series titled Treatise on Concrete, which is edited by Roberto Gargiani and published by his university, the École Polytechnique Fédérale de Lausanne. Concrete from Archeology to Invention 1700–1769, authored by Gargiani, is the first of a group of works within the series that focus on the development of concrete during the eighteenth and nineteenth centuries in Europe. In the preface, Gargiani states that the book’s goal is to document the evolution of construction techniques through archival research. Indeed, he presents a tremendous amount of material from treatises, old journals, personal letters, and state entities that are otherwise not easily accessible. In fact, large portions of the text consist of quotations (translated into English) from the archival sources. On the one hand, this is a useful service, but on the other, any sort of narrative is lost in the minutiae. The author’s interest in the people who wrote the documents is reflected in his choice to index only proper names and not places or subjects. Nevertheless, the volume contains a wealth of valuable information if one is willing to mine it for itself.

The book begins with an exploration of the period when researchers were trying to discover the secret of the longevity of Roman concrete. Vitruvius’s treatise offered a starting point, with its formulas for creating hydraulic mortar with *pulvis* (powder) from the Bay of Naples (Pliny the Elder’s *pulvis Puteolanus*, powder from Puteoli—i.e., volcanic ash), but many people at the time believed that ancient craftsmen long before Vitruvius had created a type of mysterious artificial stone, *pierre fondue* (11–14). Gargiani notes that developments during the eighteenth century were marked by “an extraordinary mixture of scientific research and fantastic interpretation of sources and