

From Vitruvius to Alberti

Systematic Thinking in Medieval Church Design

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In this paper I will discuss the apparent lack of written architectural theory from the period between Vitruvius and Alberti, and propose the notion of architectural sub-theory, for the undercurrent systematic thinking of medieval builders.

As a building archaeologist I study the history of standing buildings, or building remains on the ground. The research methodology is based on direct observations, surveys and descriptions; the primary sources of evidence are selected measurements. These are used to define the form and size of the edifice by expressing ratios and their geometrical equivalents.

Other sources are medieval texts on planning, design and construction and modern written sources, the bibliography of which is ample. In my doctoral thesis I identified and described some 30-odd Norwegian wooden churches which predate the year 1100.¹ I deconstructed the notion of form of the buildings into a series of construction actions and ritual ceremonies to reconstruct the process and result of planning and design (Ill.1).

Books on the history of architectural theory often start with the Ten Books On Architecture by the Roman engineer Vitruvius, written around the year 26 BCE. Vitruvius treats several aspects of engineering, with lesser emphasis on architecture proper. He writes down what was commonly known in his time. When the narrative undercurrent of praxis is written down in this way, the text attains the status of normative rules and objective knowledge. Vitruvius did describe buildings in Greece, Asia and Egypt, although he may not have been outside Italy. He preferred Greek theory of art and building practice to modern Roman structural inventions. Read as a sort of building manual based on practical experience the books of Vitruvius describe in a generalized way, how things could be done. Even with his inflexible and canonical approach his instructions lack the necessary details; at the end of book IV he says there are other types of valid columns for which he does not know the rules.²

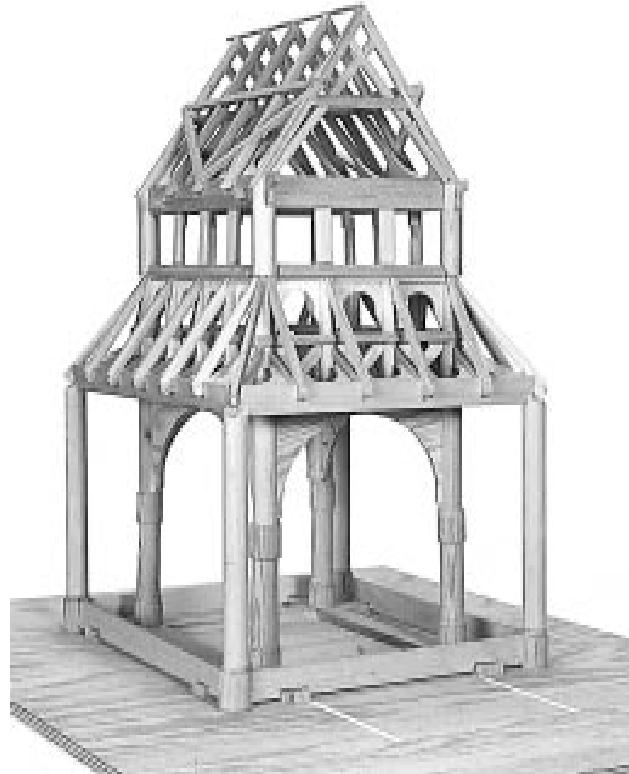
The writings of Vitruvius were known in the form of copies throughout the Middle Ages together with manuals produced by military engineers, Roman

surveyors³ and authors like Faventinus (c.300 CE) and Palladius (c.400 CE).⁴ These manuscripts were studied in monasteries and may have been valued for the cosmological information which they contained. But the original illustrations of the books were lost in the course of time, so the practical engineering solutions may not have been easy to comprehend.⁵ However, the aesthetic principles deduced from Mediterranean stone temples would have been of little use to builders of wooden churches in Northern Europe.⁶

Some 1500 years after Vitruvius the Italian architect Leon Battista Alberti wrote his *On The Art Of Building In Ten Books*. If this 1500-year gap is explained as being void of architectural theory as codified practices, one may ask what replaced them, or what supposedly constitutes an architectural theory. An architectural theory may be seen as a set of premises from which empirical rules for planning, design and construction are deducible. On its simplest level, a theory is the knowledge of a series of actions lying behind the formal result; the practice of craft providing the ground for the theory. The American architectural historian Paul-Allan Johnson proposes that theory's role in architecture has been to guide practice by a discourse. Therefore, one can say that theory has to lie behind planning and design.⁷ The Norwegian art historian Staale Sinding-Larsen states that, essentially, theory can be viewed as systematic remembrance. Different theories may then be seen as specialised and pointed versions of lists of actions.⁸ Normative statements on "how-to-do" something, do not in themselves constitute theory. A theory links ideas with practical work, the abstract with the concrete. In order to make a theory workable it has to be written down (Ill. 2).

How did medieval writers describe buildings?

There are very few medieval literary sources in the vernacular that cast light on contemporary planning and design practice. What was written down must have been chosen electively, but how to write was always prescribed. Oral transmission in the vernacular was simple, basic, cheap and fast and could be exchanged quickly; but the knowledge of skills would easily disappear with the person. In contrast, writing was ex-



pensive and technologically complex; Latin was considered the mayor language of learning and culture, therefore, most written statements are brief and generally idiosyncratic in method and content.

In the absence of general statements describing Romanesque or Gothic architecture one has turned to scholarly commentaries. Scholars educated in Biblical, Roman or Old Norse literary traditions describe, as non-builders, their experiences of edifices. A diversity of texts were produced at centres of literacy to imitate and continue old works such as chronicles, didactic prose, homilies, devotional and mystical writings. Generally, people retained in writing that which was unique and memorable to them and not the ordinary, simple ways of praxis. Despite chronological, environmental and doctrinal diversity, descriptions of churches are external and superficial. Few of the various constructional references are open to straightforward interpretation;

descriptions regarding size, form and construction are devoid of clear definition, even when the author tells us he was himself an eye witness.

The Church was the custodian of writing, both as craft and artefact. In his writings dating from about 1144, Abbot Suger of St.-Denis expresses how architectural forms serve the metaphysical notion of the church; or in the exegetical vocabulary, an anagogic interpretation of heavenly existence.⁹ Patrons were rhetorically praised by stressing novelty, affluence and the immensity of the edifices. In documentation of historical events, in saints' lives and in foundation descriptions the scholars' aloof attitudes toward the praxis of architectural design are shown. Many of the authors assert the historical truth of their narrative through cross-reference to Biblical events and edifices, particularly those that would be familiar to most readers: the Temple of Solomon,¹⁰ rebuilding of Temple,¹¹ the Ark of Noah,¹² the Ark of the Covenant with the Tabernacle,¹³ the vision of the Temple by Ezekiel,¹⁴ the Eternal City and the Holy Sepulchre are all used as established structures of factuality in order to function as external support of narratives. Descriptions of such edifices are at once very literal and very limited in their scope; their lengths appear to be real, but are not so in practical terms.

Obviously, the medieval linguistic, theological or historical analogies of architecture are not to be understood as architectural theories. Factual knowledge was subordinated to devotional symbolism with a vocabulary pointing to ideas beyond the form; an example is the quasi-real description of a wooden church in the so-called "Stave Church Homily".¹⁵ While there is a certain connection between liturgy and the building proper, there are no real analogies between theology and architecture; theology has no physical equivalent in materials or constructions.¹⁶ Theological exegesis is important for an understanding of medieval religion, but didactic discourses operating with general intellectual constructs are far from the builder's reality. Therefore the abstract aesthetics of scholasticism would be of little practical help in the process of planning, design and construction of any church.¹⁷

How did systematic thinking guide building design?



One may presume there were both general and detailed norms regulating the design and construction of medieval wooden churches; concrete, contextualised descriptions communicating fundamental aspects of praxis. Since there are no historical "oral mnemonics" available for study we have to interpret from building remains. For the builders knowledge of form was the means; while utility and economy were the ends. In most cases there were not many options for what form the design of a church should take, the plan and elevation were in essence a pragmatic labour of craft. Churches were copied selectively by imitating sequences of actions and were adapted to vernacular materials and economies. Design and construction were developed by individual trial and error. Builders were empirically trained and apprenticed by physically copying, by use of an undercurrent oral and tangible communication in team-working, leadership, analysis and problem-solving. In this interrelationship between thought and action the individual builder did the remembering, but all memories were attached to membership of the social group of builders. Systematic thinking on knowledge of form was transferred through the ages as a "living" narrative text, with intervention, developments and change by different builders at different times (III. 3).

The personal portfolio of Villard de Honnecourt¹⁸ (c.1220–30) is evidence of narrative transmission in the vernacular knowledge of form; drawings containing



principles of construction are explained in the shortest possible way and without elaboration; obviously meant solely for someone with an intimate knowledge of carpentry and masonry.¹⁹ Such a rare narrative in the vernacular may not be seen as the beginning of a textual discourse, but more as an extra aid to the voice, and as a cue for memory. Planning praxis, design rules and construction techniques may have been sufficiently extensive and detailed as to require conceptual framing, linking non-written praxis and written theories. Medieval masons insisted that their whole craft was based on the “art and science of geometry”,²⁰ but the prescriptions were not occupied with the mathematical side of geometry or arithmetic. Geometry as a term,

as well as the content, varied through the centuries, from a practical rule of the craft, to the most theoretical at universities.²¹ Practical geometry was not simply an application of the theoretical work of Euclid; rather it was based on reflective thoughts on form, size, technique and construction.²² Some contemporary texts describe design procedures vaguely as “the right way” of proceeding.²³

If geometry then can be regarded as design theory of size and shape, “the right way” may have included transference of numbers, ratios and geometry as scalable standards of accuracy. Churches were not designed by geometry; rather geometry was adapted to any successful construction. The geometry of the carpenters was not connected to a philosophical rationalisation of its procedures, but it must have been clear for those involved what the right and wrong ways of doing things were. Such knowledge of technique is more than can be expressed in writing, and what can be written down is not more than that which can be quantified. Much of this knowledge is undercurrent, the planning, design and building techniques were requisite codes of materials and scalable standards of accuracy. This was based on the builders’ experience memorised as steps of action. To follow these steps carefully would guarantee that the final result would look like a prototype. The builders did empirical testing of different hypotheses for solutions in design and construction. Since this was not registered, written down or elaborated methodologically it could not be called a theory proper; but it may be called an architectural sub-theory. Obviously such a narrative undercurrent of the builders had to be rejected by scholarly discourse.

How are sub-theories on wooden church design in Norway reconstructed?

In Norway round the year 1000, a small, rectangular plan with earthfast posts seems to have been common for a church, the buildings copying features of prototypes. The reconstruction of theories of church design can only be inferred from the evidence of the buildings themselves, by employing a direct, empirical and inductive approach. I have argued in my dissertation that some of the church plans share ratios of lengths and

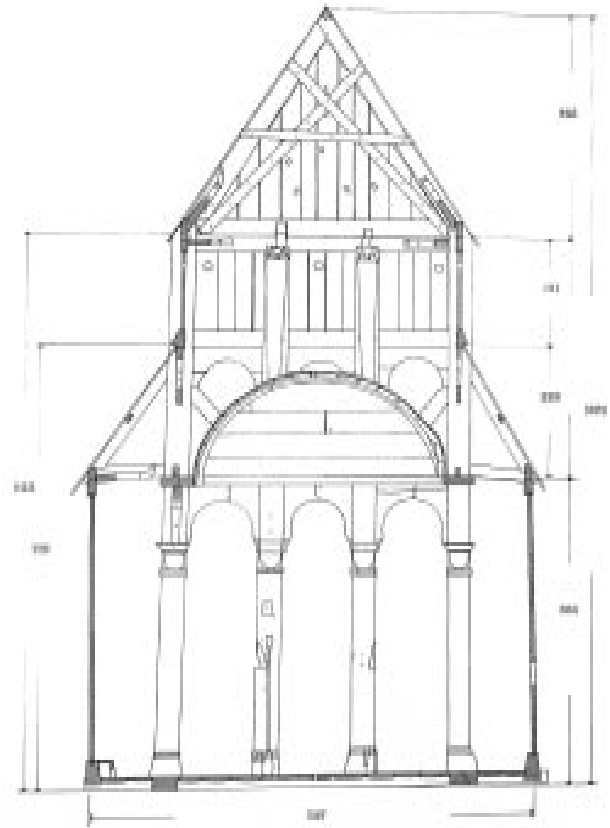
geometrical figures which are clearly intrinsic designs as variants of a common systematic way of thinking. However, although many of the churches are superficially alike, they display a huge variety of measurements and ratios. Different “best-fit” possible solutions for the plans are shown, and I conclude that it is not possible from these results to tell what the design intentions of the builder were.

The proposals of Vitruvius were bound to a stone tradition, and to search for a Vitruvian tradition in Northern European wooden architecture may therefore be in vain. The idea that the Vitruvian aesthetics is part of a universal law may have been a late invention by scholars. It may be surmised that craftsmen working in their mnemonic sub-theories on wooden churches in Norway would look upon their own rules and canons as normative and timeless, maybe “timeless principles” were ideas beyond the practical craft.

The notions centre and periphery are relative. Often the largest church in the city is assumed to be a prototype. Elements and forms are described as percolating out to rural communities from the central church. For a local church in Norway, the bishop’s town comprised a centre; for Norway, Hamburg or Aachen constituted centres; and for Hamburg, Rome and Jerusalem were in turn centres. The paths of influence may have been more complicated. Obviously, there must have been a variety of influences in terms of planning, design and building, – through the ages, from team to team and from place to place. The prototypes were different, the local conditions changed and craft practices developed. Small changes in numbers, ratios or geometrical forms would produce noticeable differences in the final design product. In this way one attained the variety that is the hallmark of medieval design.

What happened next?

In the year 1486 the Regensburg master builder Mathes Roriczer and the goldsmith Hanns Schmuttermayer of Nürnberg published “how-to-do” booklets on north-European design practices, from a much older gothic geometrical design tradition. They explained with a total lack of philosophical discourse how to create a ground plan and from that, how to derive the



elevation of a pinnacle by using geometry²⁴ putting in printed vernacular the technique of geometrical setting-out that already must have been familiar to all skilled practitioners of most arts and crafts.

The Italian humanists have been credited with the discovery of the Books of Vitruvius, even though they were known, in the form of many copies, throughout the Middle Ages.²⁵

The earliest edition of the Ten Books by Vitruvius was printed in Italy around the year 1486,²⁶ and the Ten Books by Leon Battista Alberti was published in the same year. Alberti wrote in the Vitruvian tradition, covering the same area and with the same materials and climatic conditions, albeit under different social, political and economic milieu. He wanted to make practical solutions for the architecture of the future, which was to be of the same quality as that of the nation’s forefathers. He explored and measured the ruins and com-

pared the information, through line drawings, with the interpretations of the books of Vitruvius, until he had understood what each building had to contribute in terms of ingenuity and skills.²⁷ Architects, who wanted to imitate the monuments of ancient Rome, could then distinguish the antique from more recent additions. The printed architectural treatises from this time were rendered suitable for analysis and were developed into general theories; but a methodological confusion between the representation of architecture and the process of architectural design was explicit. The treatises may have been intended for the instruction of a prince or a patron, for scholars and for would-be



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gentlemen architects with knowledge in aesthetics, but hardly for the benefit of builders. The architectural treatises from the time of Alberti were presumably never meant to replace the mnemonic specifications and ramified therefore into theories parallel to, or quite independent of, the systematic thinking on practical knowledge, the sub-theories, of the church builders (III. 4).

It has been shown that medieval scholars as mediators of ideas pointing beyond the form of existing buildings, provided analogies which were devoid of fundamental information for craftsmen. The prescribed way of writing was not written at the level of execution, but at the level of generalisation. However, the craftsmen who acted as mediators of practical work used oral and tangibly transferred knowledge of form.

I conclude therefore that the first reason for the apparent lack of scholarly architectural theories for 1500

years may have been because the narrative undercurrent of the builders' praxis was rejected by scholarly discourse. It has also been suggested that craftsmen with their sub-theories did not require written discourses to initiate, fund, plan, design, construct and develop the buildings that were required.

Notes

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