EXHIBITION

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Leon Battista Alberti: from Model to Algorithm the Alberti Digital exhibition

W E I V E R

In April 2013, the exhibition *Digital Alberti—Tradition and Innovation in the Theory and Practice of Architecture in Portugal* was opening at the Science Museum of the University of Coimbra. It results from a research project coordinated by Professor Mário Krüger, and financed by the Foundation for Science and Technology of the Portuguese Ministry of Education and Science, whose aim is to disseminate Leon Battista Alberti's architectural doctrine and the understanding of its assimilations and repercussions in the «classical» architecture designed and built both in Portugal and in the overseas territories.

Such research, which brought together a renowned group of scholars, celebrated the first translation of the treatise *De re aedificatoria* into Portuguese—order of King John III to André de Resende, the humanist from Évora—and at the same time centered focus in the most recent translation of the work accomplished by Arnaldo Monteiro do Espírito Santo and reviewed and annotated by Krüger, which was published by the Calouste Gulbenkian Foundation in 2011. The latter supported the numerous efforts of coding of the principles and rules for the construction of the buildings, translated by the researchers into algorithms, schemes and diagrams and then into a «grammar of form» converted into a parametric model implemented in a computer program, i.e. a computer model.

To scholars of the Italian Renaissance architecture, in particular of the *princeps* of humanism in the arts—Leon Battista Alberti—, may sound paradoxical an exhibition that combines the meticulous examination of the treatise, in view of the graphical reconstruction of its prescriptions, with the most advanced electronic features of three-dimensional modeling. This is the challenge faced by the curators of the *Digital Alberti* exhibition. In the text, it is known, Alberti addresses the harshest words against uninformed architects regarding the proper means for the conception of the buildings, noticing the difference between the drawings of a painter and those of the architect, mindful for «not altering the lines and maintaining the true angles» and not for «shading and diminishing lines and angles», *lineaments* minded to the *res* ae*dificatoria* and not to the *aspectus*. The admonition echoes similar observations made in the foreword of the *De Pictura*, in which he discusses the art of painting «not as a mathematician», for attentive to the appearance of things. Such zeal for mathematical accuracy in the *ars* ae*dificatoria*, for the precision of the measurements, leads the author to prescribe to the architects the use of wooden models, pondering that «it will also allow one to increase or decrease the size of those elements freely, to exchange them, and to make new proposals and alterations until everything fits together well and meets with approval. Furthermore, it will provide a surer indication of likely costs [...]» (Alberti, 1988, II, p. 34).

Thus, even before the work is built, the model allows the architect to have the building before his eyes and carefully examine the most beautiful arrangements and conformations in the whole and in the measure of its individual parts: its position regarding the *regio*,

the delimitation of the *area*, the number of parts and their position, the aspect of the walls, the soundness of the roofing, the disposition of columns, capitals, bases, cornices, pediments, coatings, pavements, statues and everything that concerns the building constitution, its inherent beauty, or its ornamentation, in order to avoid faults, imperfections and disapprovals.

And if the model is, above all, an instrument to forecast, premeditate and plan, Alberti advises on the inconvenience of making them colored, dressed with «allurement of painting», for these rather than shedding light on the project, take over the soul of those who contemplate them, seduce their eyes and by awaking admiration, diminish the sheer investigation of the parts. «Better than that», concludes the author, «the models are not accurately finished, refined, and highly decorated, but plain and simple, so that they demonstrate the ingenuity of him who conceived the idea, and not the skill of the one who fabricated the model» (*Idem*, p. 34).

As opposed to Alberti's interdictions, today's digital resources for creating and manipulating images have led to a revolution in the study of Architecture, combining perspectival construction, possibilities of cinematic animation and media interaction. Furthermore, nothing is more «Albertian» than the proposal of the *Digital Alberti* exhibition. The digital modeling programs are not employed therein with the aim of producing simulacra seductive to the eyes, however distant from the real *struttura* — to resume the encomiastic expression with which the humanist refers to Filippo Brunelleschi's dome in the prologue of the *Della Pittura* —; firstly, they respond to the intention of scrupulous investigation of Alberti's works and treatise. Not without irony, nowadays, they also allow the construction of physical models with an accuracy of execution that could not be imagined in the Renaissance.

To Alberti's reservations regarding the architects' use of perspective it is convenient to parallel his refusal to include drawings in the body of his own treatise, earnest about the imperfections that future copyists could bring to the correctness of the prescriptions: *non figuris, sed nominibus*[1]. If such precautions are largely dissipated by the advent of printing, the challenge set by Cosimo Bartoli's vulgar translation of the *De re* aedificatoria — published in 1550 and accompanied by Vasari's engravings —, still remains. The drawings incorporated into the edition — «le Piante, i Proffili, & le Faccie de uarii edifitij deſcritti da lo Autore»[2] are, as stated by Bartoli himself (1565, p. 4) in the dedication to Cosimo de' Medici, only in part produced according to the descriptions and «parte ancora come a me è parſo che egli ne habbia uoluti deſcrivere alcuni che non era posſibile di metterli mediante i ſuoi ſcritti così a pieno diſegno»[3]. And for that he admits the possibility of receiving criticism and censure, as well as the disapproval for undertaking the translation of «vno Autore, che non ſolo è difficile mediãte la materia di chi egli tratta, ma mediante i nomi non pur´ latini antichi & approuati, ma nuoui & da lui ſteſſo compoſti»[4] (*Idem*, p. 4).

Despite such limitations, Bartoli's plates to *L'Architettura* will illustrate other significant translations of Alberti's treatise, such as the Latin-Italian bilingual edition by Giovanni Orlandi (*L'Architettura*), published in 1966 by the Milanese editor Il Polifilo, or the English translation undertaken by Joseph Rykwert, Robert Tavernor and Neil Leach (On the Art of Building in Ten Books) and published by the MIT Press in 1988, with several reprints. Remained, therefore, the challenge to graphically reconstruct the Albertian rules, revealing the plenitude of images and numbers aspired by the author.

More than an exhibition, *Digital Alberti* consists of an ambitious investigative project that is aligned with other international initiatives in their eagerness to shed new light on the understanding of that which is, in Architecture, the inaugural work of modernity.

The remarkable *restitutio* of *De re* aedificatoria's visual grammar undertaken by the team of professors and researchers involved in the project, based at the University of Coimbra, brings effective advances to the one coordinated by Professor Gabriele Morolli in the 80's and 90's of the former century, which involved researchers of the Architecture PhD Program of the *Università degli Studi di Firenze* and resulted in the publication *Leon Battista Alberti: i nomi e le figure*, co-authored with Marco Guzzon (Florença: Alinea, 1994). But such an undertaking, which aimed the understanding of the «images» and «architectures» present in books VII and VIII of the treatise — «orders», temples and public buildings — offers us «non restituzioni grafiche di presunte tipologie albertiane originarie, ma schemi ausiliari per la ricostituzione concettuale e per il recupero storiografico di morfologie sino ad oggi come 'perdute' tra le 'parole' del trattato»[5] (Morolli, 1994, p. 9).

As emphasized by Mário Krüger, *Digital Alberti* fulfills an interpretive work by developing original graphical notations from the treatise, carefully observing the *verba solis* described.

The scrutiny of the treatise's precepts and corresponding graphic restitutions in schemes and digital two and three-dimensional models is guided by the utter effort of identifying a «shape grammar», — an elocutionary logic, we might add —, guideline of the albertian *oratio*. Perhaps here lies one of the most exciting aspects of the project. From the parametric models developed, the researchers produced the three-dimensional digital restitutions of the elements that conform the column's system, the albertian *columnationes* — «the principal ornament without any doubt» (Alberti, 1988, VI, p. 183) —, as well as of the sacred buildings prescribed in Book 7 of the treatise, the temples, «the greatest and most important ornament of a city» (*Idem*, VII, p. 194). And the digital forms, through rapid prototyping technologies, were materialized and transformed in the many physical models that integrate the exhibition and reveal the decoding process of the treatise.

The parametric systematizations, the full exploration of gaps, concordances and divergences between the prescribed norms and the comparison of different solutions and compositional possibilities,

according to the genres of buildings defined, all converge to an inquiry with greater purpose to assess Leon Battista Alberti's *forma mentis* regarding the project. Peculiar in this respect is the comparative analysis of the «grammar» of the treatise with the constructed buildings designed by architect, especially the church of San Francisco in Rimini (Malatesta Temple), and those of San Sebastiano and Sant'Andrea in Mantua, but also of the facades of the church of Santa Maria Novella and of the Palazzo Rucellai (accompanied by the controversial *loggia*) in Florence.

Benefiting in part from the accurate metric surveys of the architect's works made for the *Leon Battista Alberti* exhibition, held in Mantua in 1994, and available simultaneously in its catalog (Milan: Olivetti/Electa, 1994—co-curated by Joseph Rykwert and Anne Engel), the Portuguese exhibition distinguishes itself by the detailed labor of confrontation with the written norms. A path opened by scholars involved with the Mantuan exhibition, to stress upon the various modes of proportioning used by Alberti from *in situ* surveys. To bear in mind, the choice of musical relationships by arithmetical and harmonic means in *consortium* with a non-lessened use of geometric means, difficult to come by a numerical value and leading Paul Von Naredi-Rainer to ponder: «Sebbene […] appaia indubbio che per Alberti la concinnitas è legata in primo luogo ai rapporti musicali tra numeri interi, va ugualmente ricordato che non potevano essergli ignoti i metodi di proporzionamento geometrici derivanti dalla tradizione dei cantieri medievali […]»[6] (*Idem*, p. 294).

In the *Digital Alberti* project the calculation of numerical values with aim of identifying the operant systems of proportion in buildings provides updates of the treatise's «shape grammar», thus making more complex the possibilities of composition and comodulation; a kind of *ars combinatoria* that extends the formal syntax in an imperative endeavor oriented either to the understanding of Alberti's work or its means of assimilation by other architects, in the temporal milestone of the Portuguese Renaissance.

Therein lies another significant contribution of the *Digital Alberti Project* disclosed in the exhibition. Considering the circulation of the *De re* aedificatoria in Portugal since the publication of the *editio princeps*—a hypothesis stressed by Krüger (2011, p. 85) in the erudite foreword to the recent Portuguese translation of the treatise—, as well as the recognition of Alberti's authority in that kingdom, corroborated by the order of King John III to André de Resende for the Sixteenth Century translation, the researchers have devoted themselves to assess the assimilation of the albertian «grammar» in Portuguese Classical Architecture in the Counter-Reformist period.

Among the religious works built in Portugal, they analyzed the church of Espírito Santo in Évora, the Capela das Onze Mil Virgens, in Alcácer do Sal, and the church of São Vicente de Fora, in Lisbon; from the overseas, Goa's cathedral and the church of São Miguel das Missões were examined. The first, work of Manuel Pires, is an example of the so-called «plain-box» churches, a model adopted by the Jesuits; the second, «beautiful affirmation of António Rodrigues' youth», as highlights Domingos Tavares (2007, p. 76), reconciles the classical models to strict geometric order; and the third, started already in the Philippine period, expresses in its severity the Herrerian original project. The Goan cathedral follows the typology adopted in the Portuguese Sé de Portalegre, while the Brazilian church is one of the most important testimonies of the Jesuit missionary architecture.

Although they all maintain their peculiarities, a fully Renaissance character is common to such temples—evidenced by a decorous definition of the volumes and an ornamental parsimony that indicate the search for *concinnitas*—, and a *dispositio* according to the scheme «nave, chancel, side-chapels», consonants to the normative evoked by the letter of the *De re* ae*dificatoria*. The comparative analysis established between the Church of Sant'Andrea in Mantua and that of São Vicente de Fora is really of great interest, considering the probable contact of the authors (Juan de Herrera, Filippo Terzi, Baltasar Álvares) with Alberti's treatise and works. This second segment of the exhibition also displays the frontispiece of the Ducal Palace, in Vila Viçosa, in comparison to that of the Rucellai Palace, in Florence, examined in relation to the prescribed in the treatise to emphasize the lack of similarity between the generative systems of their respective grammars.

Beyond the pedagogical character, the vision of such accurate physical and electronic models certainly delights; a playful aspect with a unique educational interest before the vast informative combinations brought by the *Digital Alberti* exhibition, providing winged eyes, the farthest boundaries, to the knowledge of the humanist's works.

1 → «Here I ask those who copy out this work of ours not to use numerals to record numbers, but to write their names in full […]» (Alberti, 1988, VII, pp. 200-201).

2 → «the plans, profiles and facades of several buildings described by the author».

3 → «part still like seemed he had wanted to describe some that were not possible to be completely designed from his writings».

4 → «an author who is not only difficult for the matter that he deals with, but for the names not Latin ancient and approved, but new and composed by himself».

5 → «consisted not in graphical restitutions of assumed original Albertian typologies, but in auxiliary schemes for the conceptual reconstitution and for the historiographical recovery of morphologies still perceived as "lost" amid the "words" of the treatise».

6 → «Although [...] it appears beyond doubt that for Alberti concinnitas is connected primarily to the musical relationship between whole numbers, it must also be noted that he could not have ignored the geometric proportioning methods derived from the tradition of the Medieval construction sites [...]».

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