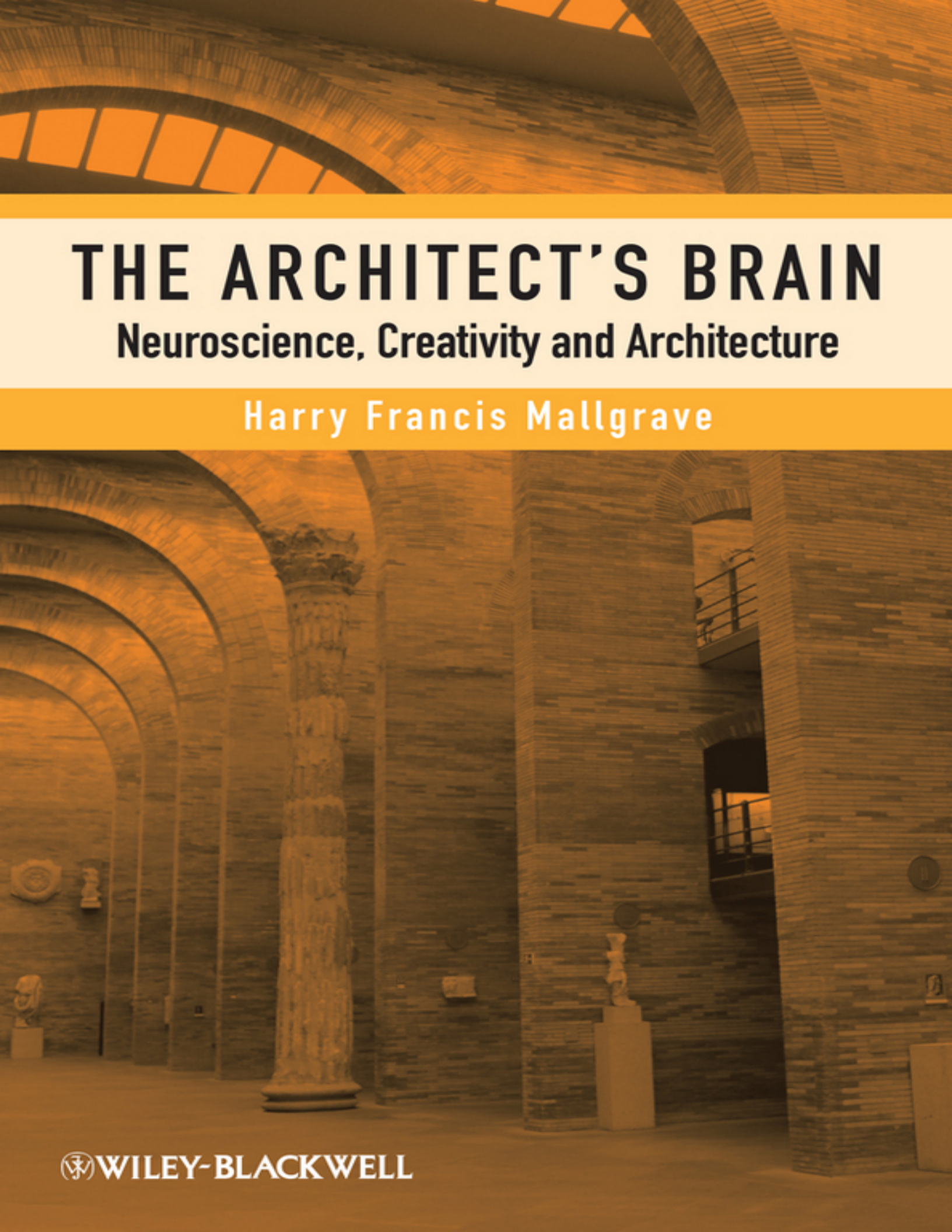

THE ARCHITECT'S BRAIN

Neuroscience, Creativity and Architecture

Harry Francis Mallgrave

WILEY-BLACKWELL

Contents

Index

Other Wiley-Blackwell titles by Harry Francis Mallgrave

An Introduction to Architectural Theory: 1968 to the Present

Harry Francis Mallgrave and David Goodman

A sharp and lively text that offers a substantive yet accessible narrative history of this period, *An Introduction* charts the veritable revolution in architectural thinking that has taken place, as well as the implications of this intellectual upheaval for the field.

Paperback isbn 978-1-4051-8062-7

Architectural Theory Volume 1: An Anthology from Vitruvius to 1870

Edited by Harry Francis Mallgrave

Architectural Theory: Vitruvius to 1870 surveys the development of the field of architecture from its earliest days to the year 1870. The first truly comprehensive anthology that brings together the classic essays in the field, the volume chronicles the major developments and trends in architecture from Vitruvius to Gottfried Semper.

Paperback isbn 978-1-4051-0258-2

Architectural Theory Volume II: An Anthology from 1871 to 2005

Edited by Harry Francis Mallgrave, Christina Contandriopoulos

This second volume of the landmark *Architectural Theory* anthology surveys the development of architectural theory from the Franco-Prussian war of 1871 until the end of the twentieth century. The entire two volume anthology follows the full range of architectural literature from classical times to present transformations.

Paperback isbn 978-1-4051-0260-5

The Architect's Brain

Neuroscience, Creativity, and Architecture

Harry Francis Mallgrave

WILEY-BLACKWELL
A John Wiley & Sons, Ltd., Publication

This paperback edition first published 2011

Edition history: Blackwell Publishing Ltd (hardback, 2010)

Blackwell Publishing was acquired by John Wiley & Sons in February 2007. Blackwell's publishing program has been merged with Wiley's global Scientific, Technical, and Medical business to form Wiley-Blackwell.

Registered Office
John Wiley & Sons Ltd, The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, UK

Editorial Offices
350 Main Street, Malden, MA 02148-5020, USA
9600 Garsington Road, Oxford, OX4 2DQ, UK
The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, UK

For details of our global editorial offices, for customer services, and for information about how to apply for permission to reuse the copyright material in this book please see our website at www.wiley.com/wiley-blackwell.

Library of Congress Cataloging-in-Publication Data

Mallgrave, Harry Francis.
The architect's brain : neuroscience, creativity, and architecture / Harry Francis Mallgrave.
p. cm.
Includes bibliographical references and index.
ISBN 978-1-4051-9585-0 (hardcover : alk. paper) ISBN 978-0-4706-5825-3
(paperback: alk. Paper)
1. Cognitive neuroscience. 2. Architects. 3. Architecture and philosophy. 4. Architecture and science. 5. Creative ability. I. Title. II. Title: Neuroscience, creativity, and architecture.
QP360.5.M35 2010
612.8′233–dc22
2009036208

A catalogue record for this book is available from the British Library.

This book is published in the following electronic formats: ePDFs 9781444317282; Wiley Online Library 9781444317275; ePub 9781118078679

Illustrations

11.2 Visual processing areas of the brain (V1–V4)
11.3 Leon Battista Alberti, Santa Maria Novella, Florence (1448–70)
11.4 Frank Lloyd Wright, Robie House (1908–10)
11.5 Frank Lloyd Wright, Robie House (1908–10) (detail)
11.6 Andrea Palladio, Church of Il Redentore, Venice (1577–92)
11.7 Andrea Palladio, San Giorgio Maggiore (c.1565–80)
11.8 Andrea Palladio, Church of Il Redentore
12.1 Parthenon, Athens (447–432 BC). View of the east facade
12.2 Temple of Hephaestus, Athens (449–415 BC)
12.3 Gerald Edelman’s “Theory of Neuronal Group Selection”
12.4 Thalamocortical Loop (after Gerald Edelman)
12.5 Antonio Gaudi, The roof of the Casa Battlo, Barcelona (1904–6)
13.1 Longitudinal section through the brain showing areas activated by emotions and feelings, with a transverse section through the brain showing the location of the insula
13.2 Areas of the brain involved with hearing, speech (Broca’s area), language comprehension (Wernicke’s area), and sensorimotor activities
13.3 The supramodal network that is activated during spatial processing for either visual or tactile stimuli

Introduction

My intentions in writing this book are twofold: first to look at the remarkable strides currently being made in neuroscience, and second to begin the lengthy process of discerning what this new knowledge might have to say to architects and many others involved in fields of design.

In the first regard, one can scarcely be disappointed. Even a cursory glance at what has taken place in scientific laboratories over the last decade – from leaps of knowledge along a neurobiological front to sophisticated imaging devices recording the activities of the working brain – reveals that we are living in the midst of monumental discoveries. For, in gaining an increasingly detailed understanding of the human brain, we are not only achieving major insights into the nature of what has historically been called the “mind” but also exploring such piquant issues as memory, consciousness, feelings, thinking, and creativity. This understanding is radically reshaping the image of who we are and where we come from, biologically speaking, and at the same time it is allowing us for the first time to ponder answers to some questions that have been posed over thousands of years of metaphysical speculation.

Certainly one of the more pivotal insights of our day, one that is particularly germane to our digital age, is that we are not machines, or more specifically, our brains are not computers. In fact, the nonlinear way in which the brain gathers and actively structures information could not be more different from the manufactured logic of a computer. The brain, to put it in more graphic terms, is a living, throbbing organ, one that over millennia (with its ever increasing consumption of the body’s fuel) has gone to extreme lengths to guard our essential well-being and

enhance the propagation of the species. Taking into account its totality – from the thin mantle of gray matter scrunched along the inside cavity of the cranial vault to the nerve cells in our feet – the brain is a fully embodied entity. It is a physical entity but at the same time its whole is greater than the sum of it electrical and chemical events.

Such an understanding is not only reconfiguring the image of ourselves but also casting a distinctly archaic air on that long-standing distinction between body and mind. The brain comes equipped with approximately 100 billion neurons and with a DNA complex of 30,000 genes, which were fully sequenced only in 2006. Oddly, though, the brain arrives at birth with only about half of its nerve cells, or neurons, wired together, and this again is a fact of great importance. If indeed it is we who do much of the neural wiring through the postnatal experiences with which we invest this palpitating entity then we should assume the same responsibility for the brain's development. We, in fact, have the power to alter much of our neural circuitry (for better or worse and within limits of course) until the day we die. As architects this means one thing: we can always become better designers by adding to the complexity of our synaptic maps, and thereby create a better or more interesting environment in which the human species can thrive.

Moving beyond such generalities, however, the issue of what the recent advances of neuroscience says to architects becomes more difficult. Historically, one of the problems has been that, until the last decade or so, few instruments of science were trained on healthy brains. Today the problem has become the opposite; with the proliferation of the new imagining devices beginning in the late 1980s, we now have a prodigious amount of experimental literature being gathered on a daily basis, so much so that it is difficult to see the proverbial forest from the trees. With the still accelerating pace of investigation, we have also seen a

broadening of areas to which this research is being applied. In 1999, for instance, the London microneurologist Semir Zeki, who had devoted more than 30 years to mapping the brain's visual processing, shifted the direction of his research by proposing a field of "neuroaesthetics" to explore the brain's interaction with art.[1] Parallel with his efforts, the art historian John Onians, who too has long been interested in the biological foundation of artistic perception, has proposed a "neuroarthistory," following the lead of one of his mentors, Ernst Gombrich.[2] Another researcher at University College London, Hugo Spiers, has recently collaborated with an architect and held workshops at London's Architectural Association.[3] In the spring of 2008 the artist Olafur Eliasson joined others in Berlin in forming the Association of Neuroesthetics, which promises to serve as "a Platform for Art and Neuroscience."[4] Meanwhile, in San Diego, a group of architects and scientists, led by the architect John P. Eberhard, have founded the Academy of Neuroscience for Architecture (ANFA), with the explicit mission of promoting and advancing "knowledge that links research to a growing understanding of human responses to the built environment."[5] Such interdisciplinary alliances will no doubt continue to multiply and expand their range of interests over the next few decades.

The question, then, is where these collaborations may lead. The interests of Zeki, Onians, and Eliasson are grounded in aesthetics and therefore ponder such questions as the neurological basis for experiencing art, while the ANFA proposes experimental research that can be applied directly to design. In this last respect, one is reminded of the promises of some of the behavioral sciences of the 1960s, when the studies of anthropologists, sociologists, and psychologists held out the prospect of working models that could improve the human condition. There is, however, one

crucial difference to be found in these activities in the 2000s, which is that we now have quite different tools and a growing bounty of biological knowledge at our command. These new instruments are giving us a more insightful and, in some cases, a quite specific picture of how we engage the world.

Having said this, I want to stress that my approach is slightly different. My interest lies principally with the creative process itself, that is, with the elusive issues of ambiguity and metaphoric thinking that seem to lie at our very core. And what I see neuroscience offering designers today, quite simply, is a sketch of the enormous intricacy of our intellectual and sensory-emotive existence. I say this with no trepidation, even if it also means that this research will not as yet offer us any neat or easy answers and, in fact, will rather quickly be overtaken by its own progress. If, today, we are for the first time taking images of the working brain in all of its complexity, we are still a few years away from constructing the final genetic and epigenetic models of this involved process. For this reason, this newly forming terrain of investigation should be of especial importance to younger designers, whose careers will no doubt unfold within the continuing advancement of such knowledge.

Nevertheless, the portrait that is emerging of the seemingly infinite diversity or multiformity of human existence is not a strikingly new figure. Scientists, psychologists, religious leaders, philosophers, and artists of every bent have been telling us the same thing since the beginning of recorded time. And architects, if I might borrow an analogy from Zeki, have always been neuroscientists – in the sense that the human brain is the wellspring of every creative endeavor, and the outcome of every good design is whether the architect enriches or diminishes the private world of the individual experiencing it.

To provide some historical background on this matter, I have, in Part One of the study, attached a series of short essays, mostly about architects who earlier considered the issue of how we view and ponder the built world. They depict insights that, when seen within the present context, stand out as exceptional for their time. The sketches are purposely piecemeal and incomplete, and the idea that there is something like a “humanist brain” or a “picturesque brain” will strike some as odd. My point in employing such a strategy is not to defend the thesis in a strict sense (although there is increasing evidence with our new understanding of plasticity that this is in fact the case), but rather to suggest how “old” some of these newer ideas of today can be judged to be. While not intending to narrow the arc of architectural design or invention, I offer these intellectual moments – from Leon Battista Alberti to Juhani Pallasmaa – because some of these ideas are indeed finding affinities, if not validation, in today’s research.

Similarly, the neurological chapters of the second part of the study, which can be read separately from these essays, are little more than gestures offered tentatively, as the work of the next few years will no doubt shed much more light on them. What is already becoming clear today, however, is that the model of the human brain that is emerging is not a reductive or mechanistic one. The labyrinthine character of this sinuous organ is not only deeper or more profound in its involved metabolisms than we previously imagined but it is also open-ended in its future possibilities, or the course that humanity and human culture will eventually take. Therefore our knowledge of its workings will never suggest a theoretical program for architecture, a new “-ism” to be captured as the latest fad. I say this in full view of the course of architectural theory over the past 40 years – the short-lived parabolic trajectories of the postmodern and

poststructural movements and their evolution into digital and green design.

If neuroscience will not suggest a theory, it may offer something else, which is a theoretical route or the ability to reformulate a few basic questions about the person for whom the architect designs. In the early 1950s the architect Richard Neutra made a precocious plea for the designer to become a biologist – in the sense that the architect should center his or her concern not on formal abstractions but on the flesh-and-blood and psychological needs of those who inhabit the built world. One might echo similar sentiments today by suggesting that the notion of “ecology” could be recast in grander biological terms as a field of “human ecology,” in which the idea of sustainability extends a theoretical arm to embrace the complexities of the human organism and its community. Arguably, the neurological outline for such an approach is now taking shape, and the prospects, even when considering such enigmatic issues as the designer’s creativity, are intriguing. Becoming more fully aware of the extent of our biological complication, whose underpinnings reach deeply into the sensory-emotive world that we daily inhabit, is simply a first step in this process.

I want to thank several people who have assisted me, first of all John Onians, who first raised the artistic importance of neuroscience in a most compelling way. An invitation to a workshop from the University of British Columbia on “Varieties of Empathy in Science, Art and Culture,” deepened my interest because it allowed me not only to return to some old themes but also to see that these themes had been enjoying resurgence in psychological and philosophical circles today – largely through the impetus of neuroscience. A graduate seminar at Illinois Institute of Technology with a highly energetic and talented group of students further advanced my thinking, and I want to credit the efforts of Matthew Blewitt, Thomas Boerman, Linda

Chlimoun, Jeremiah Collatz, Ahmad Fakhra, Frederick Grier, Kyle Hopkins, Henry Jarzabkowski, Michael Jividen, Alexander Koenadi, Christine Marriott, Bryan May, Lorin Murariu, Ronny Schuler, Gideon Searle, Albin Spangler, Ben Spicer, and Jennifer Stanovich.

Several people have been gracious to read parts of this manuscript. I would like to thank Marco Frascari, David Goodman, Sean Keller, Kevin Harrington, Tim Brown, Eric Ellingsen, and Peter Lykos for their constructive advice. I am most grateful to Amjad Alkoud for his work on all of the scientific illustrations. I would also like to thank many others at IIT who have been of assistance, among them Romina Canna, Peter Osler, Rodolfo Barragan, Steve Brubaker, Tim Brown, Kathy Nagle, Matt Cook, Nasir Mirza, Thomas Gleason, Rich Harkin, and Stuart MacRae. Above all I would like to express my gratitude to my lovely wife Susan, who not only offers expert editing and advice, but who has always supported my extended work habits in so many ways.

Part I

Historical Essays

1

The Humanist Brain

Alberti, Vitruvius, and Leonardo

first we observed that the building is a form of body
(Leon Battista Alberti)[1]

In most architectural accounts, Renaissance humanism refers to the period in Italy that commences in the early fifteenth century and coincides with a new interest in classical theory. The ethos of humanism was not one-dimensional, for it infused all of the arts and humanities, including philosophy, rhetoric, poetry, art, architecture, law, and grammar. Generally, it entailed a new appreciation of classical Greek writers (now being diffused by the printing press), whose ideas had to be squared with late-antique and medieval sources as well as with the teachings of Christianity. In this respect, Leon Battista Alberti epitomized the humanist brain.

In the case of architecture, humanism often had a slightly different connotation. It has not only entailed the belief that the human being, by virtue of his divine creation, occupies a privileged place within the cosmos but also the fact that the human body holds a special fascination for architects. I am referring to the double analogy that views architecture as a metaphor for the human body, and the human body as a metaphor for architectural design. In this sense too Alberti was a humanist, for when his architectural treatise of the early-1450s appeared in print in 1486 (alongside the “ten books” of the classical Roman architect Vitruvius) he

promulgated a way of thinking about architecture that would largely hold fast until the eighteenth century. In this way Alberti became perhaps the first architect in history to construct a unified body of theory – what historians have referred to as the theoretical basis for a new style.

Born a “natural,” or illegitimate, child into a wealthy family of merchants and bankers, Alberti came to this task with mixed blessings.[2] If his illegitimacy deprived him of legal inheritance, his family purse at least insured him of a good classical education at the University of Bologna, where he took his doctorate in canon law in 1428. By this date he had already begun to disclose his literary talent (his writings on a variety of subjects are prodigious) and interest in mathematics. Like many well educated men of the time, he gravitated into the service of the church, first as a secretary to the cardinal of Bologna. Four years after taking his doctorate, in 1432, he was living in Rome as a secretary to the head of the papal chancery, and therefore working indirectly for the pope. In 1434, however, civil unrest forced the papal court to leave Rome for Florence. It was here, where a new approach to architecture, sculpture, and painting was already taking hold, that Alberti formed a friendship with Filippo Brunelleschi and Donato Donatello, both of whom he may have met a few years earlier. Their shared interests were added to when Alberti began to paint, and within a year he wrote the first of his three artistic treatises, *De pictura* (On Painting, 1435). The date of his second artistic tract – *De statua* (On Sculpture) – is unknown, although it was quite possibly composed in the late 1440s. Meanwhile, around 1438, Alberti journeyed with the papal court to Ferrara, where he cultivated his interest in architecture. This pursuit intensified when Alberti and the papacy returned to Rome in 1443 and the scholar, once again following in the footsteps of Brunelleschi, began his investigation of Roman classical monuments. Out of these

labors, and with his growing assurance, came his third and final artistic treatise, *De re aedificatoria* (On Building), which he presented in 10 books to Pope Nicholas V in 1452. With this task completed, Alberti devoted the next 20 years of his life to the practice of architecture, for which his fame surpassed that of his many literary endeavors.

De Pictura and *De Statura*

Although his treatise on architecture remains his largest theoretical undertaking, the two smaller studies on painting and sculpture already tell us much about his artistic outlook. *De picitura* is, first of all, a highly original work attempting to delineate the principles of linear perspective. Its aim is to elevate painting above the status of artisanship, and it provides several useful pointers about how painters can curry the favor of generous patrons by cultivating good manners and practicing high morals.[3] In its dedication, Alberti exalts the inspired work of Renaissance artists by equating their efforts with the "distinguished and remarkable intellects" of classical times.[4] Chief among them is Brunelleschi, who had recently completed the dome for the Florentine cathedral – that "enormous construction towering above the skies, vast enough to cover the entire Tuscan population with its shadow, and done without the aid of beams or elaborate wooden supports."[5]

De pictura has two broad themes. One is Alberti's attempt to supply this new 'fine art' with the theoretical underpinnings of geometry, which for him is not a mathematical issue but rather a divine ideal that brings an imperfect human being into closer harmony with the divinely created order of the universe. Geometry, for Alberti, is the humanization of space, and in fact the treatise opens with his apology for invoking geometry "as the product not

of a pure mathematician but only of a painter."[6] Alberti also bases the measure of his perspectival geometry on three *braccia* – "the average height of a man's body."[7] Thus the rules of perspective are corporeally embodied in human form.

The second theme is the concept of *historia*, the elaboration of which encompasses nearly half of the book. It does not mean "story," as Alberti makes clear, and he devotes page after page to discussing how to achieve "this most important part of the painter's work."[8] Collectively, this vital artistic quality resides in achieving grace and beauty in a work by displaying people with beautifully proportioned faces and members, possessing free will and appropriate movements, depicting a variety of bodies (young and old, male and female), abundant color, dignity and modesty, decorum, drama, monumentality, but above all, the animate display of emotion. *Historia* commands the artist, through his creativity, to produce a work "so charming and attractive as to hold the eye of the learned and unlearned spectator for a long while with a certain sense of pleasure and emotion."[9] It has therefore been said that just as Alberti's theory of perspective provides a visual link between the painter's eye and the objects within the spatial field, his notion of *historia* supplies an emotional link that should move the spectator to experience empathy. Quite naturally, he believed it to be an attribute favored in antiquity, and thus it is entirely logical for Alberti to open the third book of his treatise by encouraging painters to become familiar with classical poetry and rhetoric.[10]

This humanist slant is also very apparent in his tract on sculpture, in which he provides an individuated proportional system based on the variable measure of six human feet (therefore fixed according to the person and not to a standard, differing for persons of different height or foot

length). Vitruvius, of course, had opened the third book of *De architectura* with a similar proportional system, albeit with some notable differences.[11] Vitruvius's system of proportion, closely related to his notion of symmetry (*symmetria*), was based on a series of fractional relations of the body parts to the whole (the head, for instance is 1/10 of the body's height), whereas Alberti divides each foot into ten inches and each inch into ten minutes in order to give very precise measurements. Vitruvius had also presented his proportional system just before he described the human figure lying on his back with outstretched arms and feet, contained within a circle and square. Alberti, however, presents his system without metaphysical fanfare. His numbers are purely measurements, even if also derived from the human body.

De Re Aedificatoria

But this does not mean that Alberti did not have his rationale. We can see this by turning to his much lengthier treatise on architecture, *De re aedificatoria*, where his artistic ideas find their logical conclusion. And if there is one compelling metaphor that appears consistently throughout the exposition of his theory it is the idea of corporeality – architecture as the re-creation of the human body. "The Great experts of antiquity," as he informs us in one passage, "have instructed us that a building is very like an animal, and that Nature must be imitated when we delineate it."[12] Again,

> the physicians have noticed that Nature was so thorough in forming the bodies of animals, that she left no bone separate or disjointed from the rest. Likewise, we should link the bones and bind them fast with muscles and ligaments, so that their frame and structure is complete

and rigid enough to ensure that its fabric will still stand on its own, even if all else is removed.[13]

This corporeal metaphor determines terminology. Columns and fortified areas of the wall are the “bones” of a building, the infill walls and paneling serve as muscles and ligaments, the finish of a building is its skin.[14] The roof, too, has its “bones, muscles, infill paneling, skin, and crust,” while walls should not be too thick, “for who would not criticize a body for having excessively swollen limbs?”[15] Every house, moreover, should have its large and welcoming “bosom.”[16]

Architecture for Alberti, more specifically, is not to be formed in the manner of just any human body, and thus his standard, or canon, demands a cosmological foundation. His opus on theory begins with the definition of a building as a “form of body,” which “consists of lineaments and matter, the one the product of thought, the other of Nature.”[17] In this duality, we have the raw materials of nature at human disposal, upon which the architect impresses a design, like the divine creator, through the power of reason. Book One is entirely given over to the issue of lineaments, which Alberti defines as “the precise and correct outline, conceived in the mind, made up of lines and angles, and perfected in the learned intellect and imagination.”[18] Lineaments, as his larger text makes clear, are more than simple lines or the composition of a building’s outline; they form the building’s rational organization that is open to analysis through the six building categories of locality, area, compartition, walls, roofs, and openings. Area, the immediate site of a building, is where Alberti brings in his discussion of geometry, but compartition seems to be the essential term for him. It calls upon the architect’s greatest skill and experience for it “divides up the whole building into the parts by which it is articulated, and integrates its every part by composing all the lines and angles into a single, harmonious work that

respects utility, dignity, and delight."[19] It also encompasses the element of decorum in mandating that nothing about a building should be inappropriate or unseemly.[20]

Little that we have discussed so far departs from classical Vitruvian theory, which too is founded upon the belief that every composition of the architect should have "an exact system of correspondence to the likeness of a well-formed human being."[21] Neither is it especially at odds with the Stoic inclinations of Vitruvius, which allowed him to emphasize, above all, the primacy of sensory experience.

But Alberti will not be content with this resolution because he believed that Vitruvius never clearly disclosed how one could achieve this higher harmony of parts. Therefore he introduces a second duality that mirrors his earlier one of lineaments and nature, which is the dialectic of "beauty" and "ornament." He introduces both concepts in Book Six, a point at which he resumes his treatise after a lapse of some time, in part, as Alberti himself acknowledges, because of the extreme difficulty of the task. In truth, he probably used his literary hiatus to consult a number of other classical sources.

We can surmise this, at least, when he proffers his first tentative definitions of his new duality: "Beauty is that reasoned harmony of all the parts within a body, so that nothing may be added, taken away, or altered, but for the worse."[22] This "great and holy matter" is rarely found in nature, which Alberti reports (with a typical corporeal metaphor) by citing a dialogue from Cicero's *De natura deorum* in which a protagonist notes that on a recent visit to Athens he rarely found one beautiful youth in each platoon of military trainees.[23] Alberti seeks to repair this general deficiency of nature by offering the idea of ornament, which, in a cosmetic sense, can mask the defect of someone's body, or groom or polish another part to make it more

attractive. Thus, beauty is an “inherent property” of something, while ornament is “a form of auxiliary light and complement to beauty.”[24]

But this tentative definition, as the reader soon learns, is entirely misleading. Ornament, in particular, is for Alberti a much broader concept. It, along with beauty, can be found in the nature of the material, in its intellectual fashioning, and in the craftsmanship of the human hand.[25] The notion of ornament can also be applied to many other things. For example, the main ornament of a wall or roof, especially where vaulted, is its revetment.[26] The principal ornament of architecture is the column with its grace and conference of dignity.[27] The chief ornament of a library is its collection of rare books (especially if ancient sources).[28] And the ornaments of a city can reside in its situation, layout, composition, roads, squares, parks, and individual buildings.[29] A statue, he notes on one occasion, is the greatest ornament of all.[30] If there would be one way to summarize Alberti’s view of ornament, then, one might say that ornament is the material of building or design, either in its natural condition or with human labor applied to it – that is, it is material intrinsically attractive or impressed in some way by the human hand and brain. Such a definition is vaguely similar to but not coincidental with Vitruvius’s conception of ornament as a formal vocabulary, a system of *ornamenta* or rules of detailing applied to architectural *membra* (members).[31]

Nevertheless, this is not all that Alberti has to say on the subject, for three books later (in Book Nine) he returns to this “extremely difficult inquiry,” now armed with new terminology. Once again a corporeal analogy precedes his discussion, as Alberti considers the relative merits of slender versus “more buxom” female beauty. His objective is not to

answer this human question, which smacks too much of subjectivity, but rather to provide beauty with a more solid or absolute underpinning. Hence beauty cannot be founded "on fancy," but only in "the workings of a reasoning faculty that is inborn in the mind."[32] And because reason is a human privilege specifically endowed by God, the brain and its reasoning power is invested with divine authority. This duality of beauty and ornament is then superseded by a new idea, the third mediating concept of *concinnitas*.

Deriving from the Latin, the English "concinnity" still perfectly expresses the concept that Alberti defined as "the spouse of the soul and of reason," and it has as its task "to compose parts that are quite separate from each other by their nature, according to some precise rule, so that they correspond to one another in appearance."[33] It is not a term that appears in Vitruvius, and Alberti seems to have taken it from the rhetorical theory of Cicero, where, under the attribute of ornament, the classical author defines it this way:

> Words when connected together embellish a style [*habent ornatum*] if they produce a certain symmetry [*aliquid concinnitatis*] which disappears when the words are changed, though the thought remains the same.[34]

Such a definition of classical rhetoric is concerned with oratorical style, but Alberti's thought demands a more absolute grounding and thus he offers a revised definition of beauty:

> Beauty is a form of sympathy and consonance of the parts within a body, according to definite number, outline, and position, as dictated by *concinnitas*, the absolute and fundamental rule in Nature. This is the main object of the art of building, and the source of her dignity, charm, authority, and worth.[35]