Introduction

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Many studies of Western architecture and the body assume the built environment changes while the status of the body remains a physical constant unaffected by time, but greater historicity certainly lies in approaches that take both buildings and bodies to be in dynamic and even reciprocal evolution. The body as constructed by cultural historians readily transforms from a pre-modern porous being to a firmly bounded modern constitution, and beyond to assume fluid postmodern corporealities. It is the biological basis for these conceptual shifts, and its projection into architecture and space, that animates the research of the historians, architects and digital humanities professionals who authored the chapters of this volume. They all pose one overarching question: How does a period's understanding of bodies as objects of science impinge upon architectural thought or design? The answers are complex, interdisciplinary explorations of theory, technology, symbolism, medicine, violence, psychology, deformity and salvation, and they have unexpected and fascinating implications for architectural design and history.

The addition of the third factor – science – to the architecture plus the body equation leads to a more nuanced appreciation for architectural creativity and its embeddedness in other sets of social, institutional and political relationships. Whereas art historians often observe that a particular style is more body-centered than others, Greek architecture, for instance, compared to Gothic, the authors in this collection consider the state of scientific knowledge or natural philosophy, as the concept of science was known in the West until the nineteenth century, for a given period, frame these contingencies culturally and then investigate how they translated into new demands on space. At times the relationships that emerge between bodies and buildings are rather direct in the eyes of a patron or in the mind and hand of an architect. For instance, scholars who study the anatomized body in the early modern era frequently contextualize the biological sciences, leading to explorations into how a knowledge of bodily cavities might have influenced not just anatomical theaters but mortuary architecture, places of execution or even theoretical writings. At other times or in other circumstances, the association of corporeality, science and the built

environment might be mediated by theologians, historians or activists, resulting in architectural forms and spatial organizations particular to specific interests. As the essays in this volume illustrate, embodiment in architecture is a site- and time-specific event: it reflects unique historical and cultural contexts as it informs building practices and the social production of space.

Architecture, the body and science are, of course, all enormous fields of inquiry in their own right; moreover, each of them is now increasingly interdisciplinary in its approach to its objects of study. The chapters of this volume knit these discourses together in a very specific way. They take as their point of departure the body seized by science, that is, the body as an object of theoretical knowledge or technological progress, and then delve into how architecture is conceived and designed *from* this body, not just as a shelter for it. Developments in science are therefore critical in this volume, as is the discipline of the history of science, even if the latter can present some impediments. For instance, a split between the theoretical and applied sciences (technology) often divides the field. Such a distinction is obviously not productive for architecture, where construction necessarily goes hand in hand with technological advances as surely as design engages breakthroughs in theory. The body's involvement with technology might at first seem limited to the arm that swings a hammer, but authors such as Lian Chang and Jason Crow in this volume show that such a perspective fails to appreciate how cultural values color the kind of knowledge that can be apprehended through science. The role of a technologized body in reconfiguring building design and expanding architectural theory is one of the histories that the chapters of this book address.

The pursuit of *scientia* (Latin for 'knowledge') has both acted upon and represented the human body, which, like architecture, has always been socially constituted and historically situated. In pre-modern Europe, men and women thought of their bodies as a nexus of family and kinship relationships as well as a vessel that contained their metaphysical soul. The notion that their bodies might also be medical specimens came in only 'a distant third', as historian of science Katharine Park put it (2010, p. 23). Because this volume deals with the body, anatomy is an important science in many chapters, but biology was one of the 'delayed' sciences, not finding its own name, yet alone enjoying its own scientific revolution, until the nineteenth century (Shapen, 1996, 4). Hence, quite often historical expressions of spatial embodiment do not take the form we might expect, and some were consciously apprehended only within a limited group, such as the people active in the design or construction of a building. But a restricted circle does not mean that the ideas were not derived from widely known scientific discourses or direct experience of what was generally knowable through the body. Simply put, the chapters in this book are episodes in a history of architecture in which the body is the agent of change rather than style or social movements.

Science, too, is obviously historically situated (Pickering, 1992, pp. 1–26; Shapin, 1996). The ways in which science, the body and architecture intersected over the course of two millennia can easily be distorted by boundaries fashioned as recently as the nineteenth century, such as the divide between religion and science or even between the imagination and the sciences (Grant, 2001, pp. 293–355). And, whereas many historians today would claim uncategorically that the 'Scientific Revolution' never happened, others still hold that it was *the* cataclysmic event that made the world modern (Shapen, 1996, pp. 1–14). Most would agree that a cultural and empirical turn in natural philosophy took place between the end of the sixteenth century and the early eighteenth century, and that the seventeenth century was undoubtedly transformational. Yet, no systematic cultural actuality called 'science' yet existed.

Historians interested in the body as a source of architectural knowledge in the premodern era must therefore consider evidence from settings and cultural practices that would not be considered 'scientific' in the popular sense of the word today. Hence, the range of sources in this volume includes texts ranging from Greek poetry to theological tracts as well as medical manuals and architectural historiography. The authors of the modern chapters grapple with the challenges posed by the emergence of 'objectivity' in the mid-nineteenth-century sciences (Daston and Galison, 2007), while those who wrote the pre-modern chapters take for granted that clinical objectivity was rarely the goal of science at a time when churches and theaters could serve as laboratories, and when 'principal investigators' were philosophers, clerics or artists just as easily as physicians or astronomers. If an artist's experience in front of open cadavers influenced depictions of the human body, why would it not inform architectural thought as well? Studies that have seriously taken up this challenge, such as Barbara Stafford's *Body Criticism* (1991), are far too rare. The research presented in this volume seeks to normalize such questions to the point that one asks not why, but *how* science and the body have impacted architectural theory and practice.

Architecture and the Body necessarily ventures into the anthropomorphism of the built environment, an area of inquiry no longer relegated to the sub-genre of novelty buildings or, worse, 'primitive' organic architecture. For today's sociological and psychological researchers, the projection of anatomical structure, physiological processes or mental intentions onto objects is far from a 'mere' intuitive act. For Pascal Boyer, people entertain anthropomorphic representations as counterfactual speculations so that a thing might be known and experienced contrastively both in likeness and divergence to human attributes (Boyer, 1996, p. 89). Many of the essays in this volume, for instance Paula Burleigh's study of Ste-Bernadette of Banlay, demonstrate the power of anthropomorphic projection as it evolves with the history of science to serve a wide range of intellectual, emotional and social ends.

Armed with new research paradigms and an expanded field of sources, historians of architecture and space have the data to delve not only into the makers of buildings but the patrons, clients, theorists and in-dwellers as well. The essays in this volume are centered on Europe, and they juxtapose a traditional survey chronology – ranging from Archaic Greece to the post-war France – with novel investigations into the ways in which the body and science were theorized and inscribed on built environments over the course of over two millennia. The chapters cover four chronological eras: ancient, medieval, early modern and modern. In each period, save for the early modern, one chapter emphasizes a theoretical or philosophical perspective while the other(s) offer analyses of particular sites. For the early modern chapters, the empirical advances of science itself stand in for changes in intellectual history.

Lian Chang opens the volume with her provocative essay 'Architecture before the body?' which problematizes the emergence of a theory of the body in Archaic Greece. Her meticulous philological and architectural analyses show that what at first seems to be the absence of the body in Homer is in fact a clue to a very foreign, but coherent, view of corporeality which influenced the design not only of the Greek temple but the polis itself. Ece Okay's chapter, 'Healing in motion', takes the evolution of the Greco-Roman body forward from Chang's theoretical approach to highlight the intersection of medicinal and architectural practices in the imperial Roman redesign of Greek asklepieia. Inspired by innovation in curative methods (e.g., locotherapy), the Romans developed visual, aural and haptic sequencing within the grounds of the Asklepieion of Pergamon through an orchestration of spatial armatures and architectural elements.

Three medieval chapters follow the science of the body from the elite enclaves of theologians to the intimate dwellings of an increasingly secular society. All based in France for the sake of cultural continuity, the authors focus on key monuments in architectural history. Jason Crow presents a new theoretical approach to the twelfth-century Basilica of St-Denis and by extension to the history of Gothic architecture. He focuses the reader's attention not on divine light as the inspiration for the new style but instead on a proto-scientific understanding of the materiality of stone both as the body of Jesus Christ and the fleshy corpus of the church members. Stone could take on different meanings in different forms, when stacked as masonry, for instance, or when made to glow like a gem. Chapter 4 examines an equally famous edifice, Chartres Cathedral. In this interdisciplinary essay, Laura Hollengreen demonstrates how profitable it is to discuss the Gothic as an art of surfaces or 'skins' rather than the more conventional analysis based on structure. Her 'Gothic skins: penitents at the cathedral' introduces the medieval forerunners of the psychological sciences into this volume, taking on twelfth- and thirteenth-century manuals of confession, which taught priests how to read the penitent's 'writing on the body'. In the process, she identifies the Gothic portal not as an encyclopedic *summa* for all of

Christendom but as a membrane where the worshipper was both object and subject, skin and substance. In the last medieval chapter, Catherine Barrett ushers the reader not only into a more secular world, but a profane one, in her analysis of a residence, most likely a brothel, in Languedoc. Her essay 'Hybrid bodies move to center stage' examines the façade of the Maison du Grand Ecuyer in Cordes with its forty-odd sculpted figures ranging from fully formed persons and animals to part-human/part bestial hybrids. Some of the science engaged here in civil architecture would later be termed 'occult'; for instance, the evidence points to the Cathar belief in metempsychosis, or the migration of human souls into animal bodies, an idea with roots in regional views about nature. The Maison du Gran Ecuyer's hybrid figures speak not only to people about to enter these dwellings but they also cast provocative gestures and gazes across the town, expanding the reach of the science-ravaged body from the individual edifice to the urban fabric.

In the early modern period, the divide between science and religion was still not the chasm that many historians long took for granted. This much is clear in the first of three chapters centered on the sixteenth through eighteenth centuries, Chloe Costello's 'Visceral space', which illuminates the role of dissection in the invention of Michelangelo's mannerism. Noting the cut and cutaneous quality of the surfaces of the Medici Chapel, Costello links these corporeal characteristics not only to practices of anatomization but to the redemption that dissection was believed to offer Christians – a kind martyrdom *after* death – as an embodiment of the agony and Resurrection of Christ. The other two chapters centered in the early modern period bear the evidence of increasing secularization. Lisa Tannenbaum's 'Soaking in architecture' revisits the topic of curative institutions and the afflicted body encountered in Chapter 2 to view them from the perspective of Renaissance architecture and science. Her chapter sheds light on how treatments at thermal baths – just beginning to depart from the methods set by classical science authors such as Galen – rarely called upon religion for medical assistance, and instead courted mythological tropes, such as the fountain of youth, to enhance the attraction of their aqueous piazzas, unique urbanistic forms which have not received the attention they merit in any major architectural histories. The last early modern chapter, 'Academic bodies and anatomical architecture in early modern Bologna', takes the reader to the eve of modernity, when private academies spatialized the sciencized body in novel dialogues between buildings and citizens. In the city of Bologna, it is the experimental scientists themselves who surpass Renaissance theories of the body and architecture to anticipate the topic of *caractère* in architectural expression or the sexing of built form so important later in the eighteenth century.

The four modern chapters straddle the cataclysms of the Second World War, two centred on the prewar era and two the postwar period. Tobias Teutenberg's chapter opens the modern considerations of architecture, science and the body with a theoretical and historiographical survey of the

rapidly changing ways of spatial beholding in the nineteenth century. The invention the sphygmograph to measure blood pressure at mid-century proves to be a turning point for the introduction of pulse or 'rhythm' as an aesthetic and epistemological factor of architectural historiography and design. Teutenberg's essay introduces German architectural historians like August Schmarsow, whose views on rhythm engaged with the emerging science of psychology, the field which undergirds Frank Bauer's exploration of Czech Cubism in Chapter 10. Questioning common perspectives of Czech Cubism's dependency on Rationalist Vienna or Cubist Paris, Bauer returns to the reader to Europe's medieval heritage to find that a distinctly Czech Cubist-Gothic idea of the human body – its 'Gothicness' inspired by empathetic theories of spatial cognition – yielded innovative answers to architects' search for abstraction.

The two postwar chapters reunite the body with the science of technology, where it started in Chapter 1 with Chang's analysis of Greek (non-)bodies. Wanda Katja Liebermann's chapter investigates Modernism's capacity not only to accommodate bodies broken by wartime violence but to heal them psychologically. In her analysis of Jaap Bakema's design of Het Dorp, a handicap-accessible, self-governing community in the Netherlands, Liebermann interrogates the position that disabled bodies threaten the social order because they refuse the modernist orthodoxy that science can overcome disease and infirmity. A nuanced understanding of technological and corporeal paradigms demonstrates that the reformulation of antiquated conceptions of the disabled body into a more mechanistic network simultaneously fulfilled and undercut the project's liberal vision. In the book's final chapter, 'Sacred fortresses', Paula Burleigh brings together the irredeemably physical with the profoundly metaphysical in an examination of how the fallen ruins of military architecture were reconfigured to honor a modern saint in the so-called bunker church of Ste-Bernadette of Banlay in Nevers, France. Designed by Claude Parent and Paul Virilio, this remarkable edifice was contemporary with Het Dorp but realized in a particularly embodied form of Brutalism in which even bunkers could be indissolubly linked to the inner organs of those who operated them from within.

Architecture and the Body, Science and Culture opens the intellectual possibilities inherent in scientific engagements with the body to scholars and students of the visual arts, archaeology and architecture. In so doing, it spatializes body theory and the history of science and yokes them to the experience of the build environment in unexpected ways. Indeed, the chapters in this collection help establish the foundation for research in body theory that blurs distinctions between architectural and corporeal containment.

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