Book Review 4:
Wharton, Annabel Jane. *Models and World Making: Bodies, Buildings, Black Boxes*
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High praise to Annabel Jane Wharton for her most recent publication *Models and World Making: Bodies, Buildings, Black Boxes*. This long overdue study of the model in the sciences, art, architecture, finance, and popular culture is both timely and well received. As Wharton asserts, models have a long history as an integral part of our daily lives as records of the past, testaments to our aspirations, and tools intimately involved in conditioning the future. At their most basic level models are familiar in everyday life through fashion icons and miniature scale descriptions of buildings. Yet we also find models in everything from climate change forecasts and pandemic maps to Lego sets and Ancestry algorithms. It is, as Wharton reasons, because of this incredible variety of models that an interdisciplinary investigation of the subject had heretofore not been written. Rather, most model studies treat a single genre of model: mathematical, climatic, architectural, economic, or literary. To fill this lacuna in contemporary discourse, Wharton has set out with this book to broaden the conversation about models by defining, historicizing, and politicizing them.

Warton begins her excurse into the model with a brief survey of its etymology, historical evolution, and application in the sciences, popular culture, economics and play – to name only a few – with an aim of understanding its various operations. The essential attribute of a model is its relationship to a referent which, as Wharton explains, may be described as either strong or weak. That is, it may act as a dominant subject that determines its weak object or act like a copy subordinate to its strong archetypes. Then in chapter two, to highlight the historical dimension to which the model belongs, Wharton explores how the cadaver has been described, exhibited, and visually rendered from the Middle Ages until the present. The discussion shifts in the third chapter so as to foreground the political force of the model through an analysis of several architectural representations, including the series of copies made of the Church of the Holy Sepulchre, Leon Battista Alberti's Rucellai tomb in Florence, Franciscan olive wood replicas of sacred places, an archaeological model of Herod's Jerusalem, and video game renderings in *Assassin's Creed*. The final chapter asks the reader to consider how models are entangled in discourse. To do this, Wharton surveys the threats posed by what she refers to as 'black boxes', i.e., instruments whose inputs we control and whose outputs we interpret, but whose inner workings are beyond our comprehension. As Wharton observes, climate change models, which are generated by black boxes, suffer from intentional misinterpretations made by climate change deniers. Considering all this, the definition of model Wharton arrives at is:

> A model is an autonomous agent that has a referent (material, ideal, conceptual, imaginary, . . .) to which it adverts (mimetically, symbolically, symptomatically, inferentially, . . .), but from which it differs in significant ways (in its complexity, scale, material, function, way of being-in-the-world, . . .). In its relation to its referent, a model is weak or strong, sometimes oscillating between the two. A model assumes its interpreter's familiarity with its particular hermeneutic conventions. Although no model can ever licitly make truth claims, a model can be good or bad, honest or dishonest. A good model is an epistemic operator that works (abstractly, critically, ludically . . .) toward a fuller understanding of the world. All models have histories. All models act politically. And all models are entangled in discourse.

Clearly, Wharton's definition is broad and, in this way aims to include the large diversity of characteristics to which the term refers.

The disadvantage of Wharton's approach to such a broad definition of models is that it does not set clear boundaries between the terms of, say, 'model' and 'representation.' A quick perusal of the *Oxford English Dictionary* finds a definition for 'representation' that is equally broad and includes a person, object, process, or action which stands for or denotes a referent in a variety of ways. We can see from this that a model is a representation, but not all representations are models. For example, the orthogonal plan drawing of a building is a horizontal cut through an existing or proposed referent at a particular height above the ground, but it doesn't refer to the entire building in its absence. The distinction between rep

resentation and model appears to be in the utility of the model as a miniature, prototype, example, ideal or source of inspiration. It is this process of interpretation that the model's user makes a person, object, process, or action meaningful to themselves, a group of people or a situation as a model. Thus, we can say with a certain confidence, anything can be a model if is interpreted as one.

The challenge we face in establishing the boundaries of the term model is further aggravated by its conflation within methods of production. As Wharton notes, the etymology of the term 'model' comes from late middle English in the term *moldus*, meaning a "template used in building" or "hollow form for casting metal." During this period of time, the terms "mold" and "model" were often used interchangeably. It was not until industrialisation that, "model" (used as a reference to a particular mold) became part of everyday language along with the need to specify particularity in a commercial world where things were becoming increasingly fungible. We witness a similar sematic creep in Wharton's example of Pietro-Luciano Buono's algorithm for a horse's secondary gait. Indeed, the algorithm relates to its referent abstractly, but the danger of this relation occurs when the one is exchanged for the other in terms of conveying its meaning. To explain, consider an architecture student who claims, "all my building models are in this computer folder." The student's digital files are not the models themselves but instructions that a particular computer program reads to generate a visual representation of the model on a computer screen, or a Stereolithographic (SLA) 3D printer uses to fabricate the model in physical three-dimensional form. The Greeks were already cautious to make such distinctions in building construction when, as J.J. Coulton observed in *Ancient Greek Architect's at Work* how Herodotus' account for the rebuilding of the temple of Apollo at Delphi that the Greeks used the term *syngraphe* to mean a written description of the temple while a three-dimensional model was its *paradeigma*. Thus, an algorithm is not a model of a horse but a set of rules to be followed in calculations for describing or generating the gait of a horse. What these examples indicate is the need to be cautious in regard to these sorts of casual exchanges of meaning that make ascertaining an already complex term, 'model' even more challenging to define.

In the second and third chapters, Wharton introduces a unique and valuable argument for the historicalness and the politicalness of models. As she relates, much has been written about both types of models, but less thought has been given to the question of how dramatic shifts in representation in the West relate to changes in their social and material being, in its ontology or essence. For example, transformations in the visual renderings of the medical body model—from diagrammatic to hyperreal—contributed to modifications of the cadaver itself from the third century BCE Alexandria and the cadaver in the Duke University anatomy lab in 2020. Similarly, in architectural terms, models such as those exhibited at the infamous 1976-77 *Idea as Model* exhibition at the New York Institute for Architecture and Urban Studies (IAUS) bear the marks of the period in which they were made through shifts in thinking about architecture and representation.

Intriguing and expansive, *Models and World Making* introduces the reader to the complexity of seeing and critically evaluating how we make and remake the world in which we live through models. For those architects and architectural historians reading this journal, Warton's book provides an apt introduction to the complexity of meanings this familiar tool, medium and agent of change embodies. In lieu of a micro-historical study of the use of models by a particular architect, region or specific period of time, the reader will be reminded how our understanding and use of models evolves over time in different disciplines and fields of study.

In my case, this book transformed my understanding of the political issues mitigating the emergence of architectural models. By illuminating important political factors for the design and interpretation of structures such as Leon Battista Alberti's Church of the Holy Sepulchre in Florence, or Franciscan olive wood model replicas of sacred sites, the book prepares me for understanding the motivations for the models I may take up in my own work as an architect. *Models and World Making* will certainly find itself on many a bookshelf as an introduction to the topic, and a reference for considering the meaning of the term as it continues to change over time.

About the Author

An architect by training, Matthew Mindrup is an Associate Professor of Architectural History and Theory at the University of Sydney. He completed a Ph.D. in Architecture and Design at Virginia Tech University on the physical and metaphysical coalition of two architectural models assembled by Kurt Schwitters in the early 1920s. Dr. Mindrup's ongoing research in the history and theory of architectural design locates and projects the implications that materials have in the design process. Dr. Mindrup has presented some of this research at conferences and published others in *The Journal of Architectural Education* (JAE), *Interstices*, *Architecture Research Quarterly* (ARQ), *Architecture Theory Review* (ATR) and, in 2019, welcomed the publication of his book: *The Architectural Model: Histories of the Miniature and the Prototype, the Exemplar and the Muse* (MIT Press, 2019).