



Yehuda E. Kalay

*Architecture's New Media:
Principles, Theories, and Methods
of Computer-Aided Design*

Cambridge, MA: MIT Press, 2004

Reviewed by Sylvie Duvernoy

During the Fall semester of 1993, while I was a non-registered student at U.C. Berkeley, I attended the course “Introduction to Computing in Architecture” held by Professor Yehuda Kalay together with Steven Murray, and several teaching assistants. The lessons of the course approached both theoretical and practical aspects of computer-aided architectural design. Professor Murray used to lecture mainly on the practical aspects of computer technology and computer drafting (being present also at lab sessions), while Professor Kalay would focus more on the theoretical aspects of architectural design in general, and CAAD in particular. Needless to say, in their haste to actually practise software packages such as Autocad, 3Dstudio and others, students were much more eager to participate during the lessons given by Steven Murray than during the abstract lessons on design theory and its possible interaction with a computing machine, given by Professor Kalay.

This happened more than ten years ago. Professor Kalay and Professor Murray each teach their own course today, and students come to college to learn architectural design, most probably with a greater personal acquaintance with computer technology, due to the daily use of Internet since childhood.

The MIT Press has just released *Architecture's New Media*, the massive book in which Yehuda Kalay publishes the results of his life-long research. Reading it gave me the chance to appreciate what I was not ready to be taught then. In this book, the author addresses the question of computing in architecture from the standpoint of a designer and not from the standpoint of a draftsman. Therefore it is much more than a textbook for students: it is an overall reflection on architecture as a discipline and is more likely to be appreciated fully by scholars and professionals who have already experienced for some time the complexity of design and building process.

The fundamental question which the book tries to answer is: in what way can computers serve, and possibly improve, the process of architectural design nowadays? “Architecture,” says Kalay, “as a practical form of art, has been in need of computation—and computational aids—since ancient times”. So how may modern computers (strictly mathematical devices) generate solutions to design problems, or at least help the designer evaluate his own project, both during the ideation and the execution phases? Can computers offer more than the powerful instant 3D visualization of project ideas to which any designer is by now accustomed? No answer can be given to such a question without defining first what design is, how does it reach its final form, how and to whom it has to be communicated, how and by whom it has to be evaluated, etc. Thus the book is divided into five main parts: introduction, communication, synthesis, evaluation, future. Though arranged in a logical sequence, each part may be read quite independently from the others. The bibliography at

the end of every chapter, related to the area under discussion, eventually helps the reader to study in greater depth a very specific subject. (Unfortunately a similar organization was not applied to endnotes, which all are gathered at the end of the book.)

In the “Introduction” Kalay gives the reader an overview of the nature and history of computing in general and computing in architectural design in particular, from the first generation of CAD systems to the actual situation. He also presents some knowledge-based design systems, like WorldView, which he himself developed at the University of Buffalo, KAAD, developed at the University of Roma–La Sapienza, or ICADS, developed at California Polytechnic and State University in San Luis Obispo, which are attempts at transforming computers from drafting tools into design assistants able to detect inadequacies according to precise embedded design rules. These programs will be further examined in the subsequent parts of the book.

The second part, entitled “Communication,” is structured as an independent essay on the complex and reciprocal relationships between visualization and communication. Though mostly interesting, the subject goes far beyond architectural representation and information management. The chapters on computer graphics which present the basic systems of CAD (computer aided drafting) are likely to become out of date rather soon, given the constant and fast-paced evolution and increase of this kind of software application, which make possible not only 3D but also 4D visualization.

In the next two parts, “Synthesis” and “Evaluation”, the author addresses the very core of the question: how can designers use computing devices to help them in their tasks of problem-solving, and decision-making? Examples of numeric systems used as design rules by architects can be traced back to ancient Greece. Vitruvius’s world-famous treatise is the most ancient (extant) written evidence of the application of embedded arithmetic and geometric prescriptions in the design of architectural monuments. Proportioning systems, shape grammars, catalogues of functional and typological patterns, have been searched for, published, taught and applied from classical antiquity through Renaissance up to modern times. How do modern computers contribute to the progress of this incessant search?

Evaluation seems to be the answer to interactive communication between the architect and the computer during the successive steps of the design process. Kalay lists various types of evaluating methodologies, leading to the definition of algorithms that make it possible to quantify and verify some thematic aspects of the constructions planned: stability, thermal and acoustic characteristics, costs and so forth. The difficulties of these procedures lie in the accuracy of the possible prediction that can be made of the performances of non-existing buildings, according to specific goals that often have to be adjusted to ensure compatibility with other objectives.

But what about evaluating non-quantifiable qualities such as design aesthetics? Aesthetics is among the characteristics that can hardly be computed since its evaluation is essentially subjective. Yet the search for some scientific evaluation system that would help predict the future aesthetic result of design is precisely and paradoxically the very point that links and fuses the modern research to the former efforts of ancient and Renaissance architects. The problem of defining some mathematical laws that will guarantee the quality of a project idea is neither recent nor modern. There is only a modern approach to solve such a query, which is to require assistance from the blooming computer technology. But while the “Ancients” seem to have reached some self-satisfactory conclusions that were published in numerous treatises, we—Moderns—are still searching.

Forecasting the future is rather risky, Kalay says. Nevertheless some trends toward specific evolutions are already noticeable. They all reveal enhancement of shared information and collaborative design. Evaluation of quantifiable qualities will become more and more sophisticated and efficient thanks to Agencies of Intelligent Design Assistants (IDeAs): cooperative decision-making systems. *Architecture's New Media* is a book that is surely worth reading. By providing the reader with an important amount of objective information, it leads him/her into a deep reflection on the recent evolution of the architect's work and role, as opposed to its traditional essence. The totally un-passionate tone of the writer will raise passion in the reader, especially when asking some simple question such as:

If creativity is the epitome of intelligent behaviour, then developing a computational system that will accomplish it must be very hard indeed. Yet if we succeed, what will it say about us? Will it mean that creative design is not intelligent behaviour after all?

About the reviewer

Sylvie Duvernoy is an architect, graduated from Paris University in 1982. She later participated in the Ph.D. program of the Architecture School of Florence University and was awarded the Italian degree of "Dottore di Ricerca" in 1998. She presently teaches architectural drawing at the engineering and architecture faculties of Florence University. The research carried forth since the beginning of the post-graduate studies mainly focus on the reciprocal influences between graphic mathematics and architecture. Architecture history shows that geometry and its related aesthetic symbolism were always present, hidden in architectural and urban design from antiquity to modern times. The way they were involved and the strength with which they were claimed, vary according to historical periods. These relationships have always been expressed by the means of the drawing: the major and unavoidable tool of the design process. The results of her studies were published and communicated in several International Meetings and Reviews.

In addition to research and teaching, she always maintained a private professional activity. After having worked for a few years in the Parisian office of an international Swiss architecture firm, she is now partner of an associate office in Florence, the design projects of which cover a wide range of design problems, from remodeling and restoration to new constructions, in Italy and abroad. She is the Book Review Editor for the *Nexus Network Journal*.