Summary

This book, titled *The laws of architecture. Dutch architectural handbooks in the 19th century*, describes how the understanding of civil architecture in the Netherlands changed during the course of the nineteenth century. A system of rules and practical instructions founded on geometry and traditional practice made way for an ideal body of knowledge consisting of scientific and historical laws. Durability and beauty, the two most important properties of civil architecture, were no longer achieved by following geometrical rules or tried and tested practices, but could now be calculated, reasoned and proved in an 'exact' way.

These changes are examined by means of handbooks and general works relating to civil architecture that were published in the Netherlands during the nineteenth century. Part One deals with civil architecture manuals in which building materials and construction technology were of prime importance. In Part Two the focus switches to design theory and the aesthetics of civil architecture. Traditionally these branches of knowledge had been the subject of books on the classical orders, but in the second half of the nineteenth century, their function was gradually taken over by a new genre: books on architectural history. An examination of the reasons for the emergence and disappearance of the different types of books and of the shifts that occurred in their content, organization, definitions and terminology, provides insight into how the knowledge of civil architecture changed in the course of the nineteenth century.

Part One begins with the first architectural manuals published in the Netherlands, in the early nineteenth century. They followed the same ideal of knowledge as the eighteenth-century French *encyclopédies*, aiming to provide a complete overview of all kinds of knowledge – from the sciences, arts and trades. Unlike the encyclopaedias, however, the architectural manuals were not arranged alphabetically, but according to the main aspects of architecture: building materials, construction techniques and in some cases also design theory (the layout and decoration of buildings). As a result, the manuals not only presented fundamental architectural knowledge, their systematic arrangement also made it possible to see the interrelation between the subdivisions within the discipline and to comprehend it as a logical and meaningful whole. While the knowledge of building materials and construction techniques that was so crucial to the durability of architecture formed the core of most handbooks, the instructions on how to achieve that durability and which particular skills to use changed during the course of the century.

In the first two manuals on civil architecture published in the nineteenth century, *De bouwkunstenaar* [The architect] (1806) by Jacob van Dalen and *Handleiding tot de burgerlijke bouwkunde* [Handbook of civil architecture] (1833) by Leendert van Heusden, building materials knowledge consisted of lengthy and detailed descriptions of their manufacture, grading, transport, treatment and sampling. Through meticulous descriptions of external characteristics like colour and structure, architects learned about the specific properties of various materials, their most appropriate application and the most durable way of joining them together. From the 1840s onwards, the manner of description changed under the influence of insights gleaned from new branches of knowledge like geology, biology, chemistry and mechanics. In Storm van 's Gravesande's *Handleiding tot de kennis der burgerlijke en militaire bouwkunst* [Handbook of civil and military architecture] (1843) the characteristics of stone were explained with the aid of their geological history and mineralogical composition. The strength and elasticity of wood were described as the outcome of the multiplication of wood cells and the growth process of the tree. Phenomena like the shrinking, expanding, breaking and bending of materials and structural members were explained in terms of chemical and physical processes, while mechanics made it possible to determine the stability of a construction. With the help of formulae, all the structural forces could be calculated precisely.

Consequently, the importance of the architectural manual for the architect changed in the course of the century. Instead of giving a complete overview of practical rules, and of the empirical knowledge on which these rules were based, the handbooks now presented scientific laws that architects were required to learn to apply deductively. This shift in emphasis shows that the ideal of knowledge as reflected by the manuals had changed. The pursuit of a complete and systematic overview of practical knowledge was replaced by the ambition to reason and demonstrate the logic of every action with great precision, be it during the design stage or on the construction site.

A comparable shift from generally accepted practical rules to scientifically proven laws took place in the third branch of knowledge of civil architecture, namely the principles of beauty. These principles are the subject of the second part of this book. The changes in the theory of beauty are more complex, since there were two turning points rather than one. From the 1840s onwards the classical theory of beauty gave way to a historical theory of beauty, which in turn lost its authority towards the end of the century.

The classical approach entailed knowledge of the five classical orders and the rules drawn from them regarding proportion, form and decoration. In the order books, the five orders were illustrated and described in ascending order of elegance and ornamental richness. Architects learned to recognize their characteristic geometrical proportions and expressions (serious, severe, graceful, lively, etc.) which, according to Vitruvius, were derived from those of the human body. Vitruvius had also explained the logic and consequent beauty of the forms and

elements of the Greek temple as perfected imitations in marble of the huts built by primitive man.

The first history of architectural styles in the Netherlands appeared between 1843 and 1849 and consisted of a Dutch translation of the chapters on architecture from Franz Kugler's *Handbuch der Kunstgeschichte* [Handbook of art history, 1842]. In this new historical approach examples of beautiful architecture were now presented by way of a series of chronologically arranged historical structures which revealed successive changes in form, decoration and their corresponding expression, collectively known as 'styles'. In the histories of building styles, 'style' had two meanings which existed side by side. Firstly, 'style' referenced the causal link between the defining qualities and features of historical cultures (referred to as the 'zeitgeist' or 'national spirit') on the one hand, and the formal and expressive language of their buildings on the other. Secondly, 'style' was the expression of material and and tectonic principles. Beauty, fine proportions and decorations were no longer based on geometry but were required to represent as accurately as possible the nature and magnitude of the forces at work within a structure.

In contrast to the classical approach, the formal language of historical principles of beauty was subject to change. This meant that the development of beauty could no longer be described and depicted in terms of variations *within* the given classic language. Each style had to be separately described in terms of its characteristic formal language, proportions, decorations and expression, and the historical and material conditions under which it had come about. Whereas in the order books the explanatory notes were brief and the instructions for practical application were of key importance, in the histories of architectural styles, the explanation itself occupied centre stage.

Until the 1890s, there was a general expectation that the new historical theory of beauty would cause contemporary architecture to flourish. Eugen Gugel, the first professor of architectural history in the Netherlands (at the Polytechnical School in Delft) and the author of the most highly esteemed architectural history in the Netherlands, wrote that history provided contemporary architects with an unprecedented quantity and variety of exemplary architecture. In addition to his *Geschiedenis van de bouwstijlen* [History of building styles] (1869), Gugel published a book of plates *Architectonische vormleer* [Theory of architectural forms] (1880-1888) which also showed numerous details of historical buildings, although in this case they were not arranged chronologically, but according to building parts (like mouldings, doors, windows) as an aid to their practical incorporation into the design. In accordance with the classical doctrine of imitation, the architect would not simply copy these details, but combine and arrange them in an original and rational manner, thereby creating a new style.

At the close of the century the architectural histories were no longer accompanied by pattern books. The belief was that beautiful architecture could not possibly be based on historical examples, since the laws of history demonstrated that every age had its own unique style. From then on, the history of architecture was regarded as an autonomous process, without any practical implications for the

architect. The only thing history gave him was an understanding of the systematic development of architecture.

It is the thesis of this book that the changes in civil architectural knowledge in the nineteenth century as reflected in the Dutch architectural manuals of the time, were closely connected with a discovery that had a profound influence on all natural and human sciences in the nineteenth century: the notion of time as a process. There was a new perception that, rather than standing alone, each phenomenon and event was part of a chain of development and could be placed in a systematic relationship of cause and effect, action and reaction. Historical events and buildings, geological strata and biological species constituted temporal series that could be similarly ordered since they obeyed the same principles of development.

This new way of reasoning, in which every phenomenon was defined as a sign of the times, was reinforced by the frequent use of analogies between different fields of knowledge. George Lyell, for example, drew a comparison between the geological method and that used in history, linguistics and demography. Franz Kugler's handbooks on art and architectural history were informed by the work of the natural scientist Alexander von Humboldt.

In this study, the frequent use of such analogies between history and the natural sciences in the nineteenth century is offered as a possible explanation for the success of the new historical theory of beauty from the 1840s onwards. It is astonishing how, in just a few decades, the age-old, trusted classical paradigm made way for a new one that used highly complex philosophical concepts such as 'zeitgeist', 'progress' and 'development'. The idea of architectural beauty as a dynamic process in which the form was no longer given a priori (as in the classical theory of beauty), but changed according to the circumstances in which it arose, was new. Yet it was at the same time familiar, because of its similarity to the geological, biological and mechanical processes that the architect was acquainted with through his knowledge of materials and construction science.

The knowledge of the causal laws which, according to the architectural books, had become so important for the architect, was not so easily put into practice. Both the first part of this book, about materials and construction science, and the second about the principles of beauty, end with observations by the authors of such books about the gap between theory and practice. But the way this was dealt with differed according to genre. In the architectural manuals, the shortcomings and uncertainties of the new, scientific knowledge were acknowledged and where necessary, the old rules and practical instructions were still included, be it at the end of the chapters.

In the architectural histories, the opposite occurred. Instead of concluding that the new theory of historical styles was incapable of fully explaining the complex reality of the built environment, their authors branded any buildings whose stylistic characteristics did not fit into the neat historical development of style as anomalies. Dutch translations of foreign books revealed that Dutch architecture was

virtually absent from the history of architecture. But this was not regarded as a reason for criticizing the criteria that determined which buildings were deemed representative of a particular style. Rather, the translators simply concluded that there was no period in which Dutch architecture complied with the main stylistic characteristics of the age. The frequent use of brick in the Netherlands (owing to a lack of natural stone) was described as a defect of Dutch gothic architecture. The nineteenth-century 'neo' styles were also characterized as aberrations in the architectural histories written around the turn of the century: in using historical styles, nineteenth-century architects were violating the laws of history. They were going back in time, as it were, in direct contravention of the principle that every historical period has its own, characteristic style. The unicity of historical styles was no longer regarded as the result of a scrupulous selection of exemplary, beautiful buildings, but as a historical phenomenon.

Consequently, this study concludes that the simultaneous introduction of scientific and historical laws in Dutch architectural books not only explains the success of the new history-based theory of beauty from the 1840s onwards, but also its demise in the final decade of the century. The authors of architectural histories had started to believe their own, so frequently used characterization of the history of building styles as a natural, systematic process governed by forces beyond the reach of the individual architect.

It was not until the 1960s that criticism started to emerge of what had come to be called modernist architectural historiography but which, in terms of method, was actually a logical continuation of the nineteenth-century history of architectural styles. In it, a small selection of twentieth-century 'modern' buildings of steel, glass and concrete was declared representative of the modern zeitgeist and of a tectonic, rational design. This method of architectural historiography has proved to be stubborn and vigorous, and has continued to withstand criticism by incorporating it into the history. In contemporary general works on architectural history, postmodernism and deconstructivism are simply presented as the most recent in a long line of styles and phases in the evolutionary history of architecture. Thus, the history of architectural styles endures, a living fossil that bears witness to the fact that the laws of architecture described in this book are not yet a spent force.

Translation and correction Robyn de Jong-Dalziel