

From Stories to History, from History to Histories: What Can Construction History do?

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1 Review – from Story to History

In 1887, Josef Durm, "Oberbaurat" and Professor of Architecture at the *Polytechnikum* in Karlsruhe, contributed an article to the *Zeitschrift für Bauwesen* (Journal for the Construction Sector), published in Berlin, on the unarguably most significant domed buildings constructed in the 15th and 16th century: the dome vault above the Santa Maria del Fiore in Florence and the pendentive dome of San Pietro in Rome.¹ His two-part article is a detailed analysis of the genesis, technical execution and the subsequent history of the load-bearing supporting structures of these two domes, while also paying attention to reinforcements which were deemed necessary in the course of time. Durm also showed the state of knowledge at his time about the supporting structures and their details by depicting them delicately, and often in perspective, in a number of large-format drawings. Durm's investigation is in many respects still a model for today's construction historians. His subject is of outstanding relevance; both buildings have never failed to attract the curiosity of academics right up to the present. Adroitly he retrieves the relevant literature, various records, available measurements and the historical context of the constructions. An inspection, carried out by himself, supplements the study of source material. Finally, the characteristics of his methodology are his constructive critical distance, his careful review of sources, his awareness of potential problems of their translation. even the use of modern methods of calculation. But above all, the focus of his interest is not the building itself, but its load-bearing supporting structures. Durm was quite aware that his approach was fundamentally different from the prevalent historiography of architecture: "It is to wish that the above study (...) rouse young colleagues to pay more attention to the construction of buildings and to desist from producing pretty pictures or the study solely of decorative aspects. The subject of construction is rich and as interesting as that of shapes and colours, and what is more, the ground is more virginal and doubtless will become more fertile."² Durm's remarkable approach took into consideration the fundamental changes in the European perception of human existence during the late nineteenth century when technological practices and objects began to permeate and determine life, work, thinking and feeling to an extent unknown before. His enquiries - that have to be seen in the context of comparable studies in other parts of Europe as for example in France by Auguste Choisy - are indisputably early masterly achievements of a modern analysis of the history of constructional engineering - not determined by practical utilitarian interests but directed solely towards a desire to understand.

The Nineteenth Century – Applied History

Another contemporaneous approach to the history of constructional engineering was in sharp contrast: not marked by unreserved curiosity it attempted instead to use references to history in order to validate attitudes and interests prevalent at the time. One need only reflect on the immediate economic objective which forms the basis of the classic large-format treatise *Der deutsche Brückenbau im 19. Jahrhundert* (German Bridge Construction in the Nineteenth Century) by Georg Mehrrens, full professor at the Institute of Technology in Dresden, published in 1900 in German, English, and French. His treatise was the immediate result of a commission by six of the leading German bridge construction firms on the occasion of the Paris World's Fair with the explicit aim to "depict German bridge construction in its entirety and to give it effect."³

However, more interesting and serving as the actual counterbalance to Durm's analysis are contemporaneous historical reviews of construction in the textbooks for the building sector. Here history serves first and foremost as preparation and introduction to current constructional engineering practice. Corresponding to the then popular model of technology and progress history is understood as a wide river, which becomes ever more powerful and absorbs every historical advance like tributaries, forever moving towards new shores, led by the modern engineer, who without any doubt is more knowledgeable than all his precursors. This *teleological* approach to history was meant to validate the views espoused by the authors of the textbooks. The original intention of the historical approach, held for example by Rondelet or Gauthey⁴ as late at the beginning of the 19th century, that of gaining knowledge and understanding of present practices through the portrayal of historical examples, had given way to a rather condescending attitude towards the historical subject which characterised the modern movement in architecture in general. The implications were obvious. Historical reviews were increasingly regarded as utterly superfluous and faded away altogether. The Prussian author Ernst Brandt for example crystallised this shift in the self-image of engineers almost poetically in the second edition of his *Lehrbuch der Eisen-Construction* (Manual of Iron Constructing) in 1871: "Aristotle said: When a person thinks about the past, he sees the ground, when he thinks about the future, he looks up into the sky. The author is more captivated by the conditions of the present, and so it seemed to him opportune to do without retrospective considerations..."⁵

20th Century – History in the Shadow of Modernism

At the turn of the 20th century the business of the civil engineer was no longer defined by history but by an engineering science defined by mathematics and mechanical procedure. Thus the modern engineer and the modern architect set out to build the new, and better age, ignoring all tradition – or so they thought. Should history enter the discourse, it was only as a short launching pad for a broad view of the present: "During the past 50 years..." writes

Günschel in the introduction to his volume *Große Konstrukteure* (Great Constructors) "...building practices have changed more fundamentally than ever before in any comparable period."⁶ Really? What for example just about the 50 years between 1820 and 1870?!

During most of the 20th century the decline of the historical context was only tentatively questioned; very few took up and developed Durm's exemplary model of a "free" history of construction. In the German-speaking areas, a diversity of more or less professional, specially created or compiled, fragmented stories of history could be mentioned. Yet we must also mention Hans Straub,⁷ whose fame is not confined to Germany and who endeavoured to combine the many histories in a first rounded history of construction. Elsewhere in Europe and in the United States, however, the focus was often different: British treatises were either stubbornly dedicated to a single technical detail or dealt at length with the biographies of engineers; French research derived its strength from the examination of structural issues; Soviet treatises on the history of construction, much promoted since the 1930s, focused on technology and science in the context of political vicissitudes and their "operative" challenges.⁸

Viewed in its entirety and despite some efforts to the contrary, the history of construction remained well into the last third of the 20th century a rather tangential annex to the history of either building or technology, depending on the approach, but in both cases compatible with the widespread ahistorical self-conception of constructional engineering; at the same time the contrast to the economic importance of the construction industry, especially since 1945, was noticeable.

On the Threshold to the 21st Century – First Professional Approaches

Towards the end of the century we can observe a noticeable shift to a distinctly professional attitude and to international networking. In 1993 a symposium 'Between Mechanics and Architecture', held on the occasion of the 19th International Congress of the History of Science in Saragossa, attracted attention.⁹ With the Genoese Edoardo Benvenuto as the main initiator, a Europe-wide research network was established and three further annual symposia were held. Following the death of Benvenuto in 1998 his students in Genoa founded the *Associazione Benvenuto*, which continued the tradition initiated by him by holding an international conference with the title Towards a History of Construction, in 1999.¹⁰ A comparable development can be seen in Spain in the 1990s, though the movement there tended towards the problems of practical construction rather than being focused on the theoretical questions of mechanics and its applications in building. In 1996 the *Instituto Juan de Herrera* held the first *Congreso Nacional de Historia de la Construcción* in Madrid. Two further conferences were held biannually.¹¹ The exhibition *l'art de l'ingénieur* in the Centre Pompidou in 1997, 250 years after the founding of the *École des Ponts et Chaussées*, turned out to be a spectacular highlight,¹² yet the breakthrough towards a new international network of construction history came in January 2003, when several hundred academics from all over the world congregated in Madrid and boldly took part in the first International Congress on Construction His-

tory.¹³ In 2005 another a proposal came out of Genoa, for the first European research atlas of the history of construction¹⁴, and in the spring of 2006 Cambridge hosted the second International Congress on Construction History.

Just by a cursory glance at the agenda, the submissions, and the papers produced for the congress, one cannot help but notice the extraordinary breadth of this movement, both in terms of content and method. One gets the impression that a new discipline is in the process of establishing itself, transcending traditional academic demarcations. It is history of construction, history of technology, history of science, even restoration of historic structures, yet it does not fit either of these categories. It is, as the invitation to the second international congress called on "a community of scholars disunited in their aims and feeling that they do not belong to a single discipline". All the academic, historical, and scientific indicators point towards an independent discipline in the process of establishing itself – developing from stories to history.

2 Time for defining a Position

It is opportune therefore to ask where the history of construction could and should be heading. Although nowadays hardly anybody stigmatises it patronisingly as the hobbyhorse of greying devotees, no longer actively involved in construction (...let us not forget, though, that such devotees can make constructive contributions to every academic subject), nevertheless even now there are some good reasons to reflect about its actual situation .

Firstly, there is the practical yet decisive aspect of its appropriate place in the academic sector. Construction history needs to establish a sustainable presence in universities and curricula, in research projects and funding programmes. Thus we need to clarify whether construction history should be evolving as an independent new discipline or, after all, be part of either the history of construction, technology, or science.

Secondly, there is the question of the essential area covered by construction history, the question of its core, its margins, and its boundaries; what falls under its heading and what does not? In the preface to the recently published review of European research on construction history the editors argued, with emphasis and commitment, against the demarcation rituals common among some who see their work as part of the subject, however defined; instead they stressed the interdisciplinary heterogeneity as an essential characteristic and quality of the community of construction historians.¹⁵ This is quite correct; the existence of different "schools" is a sign of quality. Yet no academic discipline can ignore questions as to its subject matter or, to put it another way, to its core and its margins. Construction history will not necessarily find its own way; there is a danger that it may lapse into an arbitrary eclecticism, "all or nothing" as it were. From there on it would only be a short step to insignificance.

Questions about core and margins, content and methodology are fundamental, not only in relation to external legitimacy. They contribute decisively to a deeper understanding of specific academic tasks and their methodological nuances. The specific quality of construction history is at stake. We are concerned with a more precise definition, not with exclusion, with the core rather than with margins. Interfaces with neighbouring disciplines will establish themselves as a matter of course, except for the fact that they are always in the process of changing.

And thirdly there is the vital question: what is the purpose of construction history, where is it heading, and what is its potential significance? The British historian David Cannadine recently delivered the prestigious 25th Dickinson Memorial Lecture in London's Science Museum; he presented an illuminating analysis on this occasion. In his lecture he related the efficiency and public influence of three historical engineering associations in Britain and the US to some fundamental dissimilarities between them in terms of subjects, questions, structures, and connections to engineering science.¹⁶ Cannadine's comparison developed into a plea for opening out the history of technology into the breadth and variety of its historical context. His message was clear and simple: history *is* engineering history and engineering history *is* history, it is also cultural history, social history, and economic history. Asking the right questions is of decisive significance and determines either the success or failure of research into engineering history; Cannadine demonstrated this in his conclusion with reference to three periods in the 18th, 19th, and 20th century.

Cannadine's statement is of vital importance for the further development of construction history too. What is its self-image? What kind of influence does it aspire to? To what end does it seek to develop the huge meaningful potential, which it incorporates by reason of its object, constructional engineering?

Let us take stock: a more precise definition of construction history is absolutely essential. If the subject aims to be accepted as an academic discipline and, in confidence of its potential, to network in research and teaching with neighbouring disciplines, quick answers are not of the essence. What is required is serious reflection as to its essential aims, and its efficacy. A reflection like this touches the cognitive interests, the subject matter, the methodology, the agenda, and the potential significance of construction history at the beginning of the 21st century.

3 The cognitive interest: What Construction History aims to know?

In his contribution to the Madrid congress Stefano Musso examined some epistemological problems of construction history and presented a very elegant definition of construction: "A construction represents and occupies a sort of boundary between the world of nature and the artificial world of culture".¹⁷ This reminds us of the great English civil engineer Thomas Tel-

ford, who defined civil engineering similarly as “the art of directing the great sources of power in nature for the use and convenience of man”.¹⁸

If we accept that construction is a specific link between nature and culture, the role of construction history then is no more or less than to provide an explanation of the action of producing this hinge, in fact construction in all its facets – thinking/planning, designing, abstracting, modelling, calculating and measuring, specifying, financing, manufacturing, building, maintaining, reinforcing, destroying, disposing – in all its cross-linkages, interdependencies, and processes of interchange, right up to the use of practical applications and technology. It is the process of construction in its entirety that constitutes construction history.

In this definition, construction is the *art of making*, it is between creativity and routine, between craft and science, between invention, innovation, and tradition. It is about images in the mind, patterns, the “inner eye”, as Eugene S. Ferguson called it. It is about “... the two things that distinguish all human construction from the natural growth of living forms. One is the construction process (...). The other is human choice. (...) exercised in the process of design (...)”.¹⁹

If we interpret construction thus, it concerns far more than the narrow technical “how”. We acknowledge civil engineering as a highly interconnected process, inviting a host of further questions – questions concerning sensible use of material and resources, ecological and social effects or user friendliness, questions of sturdiness, system-inherent redundancies, durability, repair feasibility, and running costs, in fact questions as to performance in all stages of the designated life cycle.

So what is the point of the history of construction? In fact, three points come to mind:

1. How did master builders, engineers, technicians approach the above questions throughout the ages – even though they may not have asked them explicitly?
2. What other problems, questions that may seem remote to us, did they confront in their time and how did they resolve them?
3. Why did they, in their time, in their circumstances, with the materials at their disposal, come to approach, to question and to respond as they did?

Construction history has now, at last, begun to be an open-ended adventure. We realise, time and again, that construction is a multi-faceted activity. We can begin to learn about different practices, we can begin to recognise that these practices are the result of historical conditions. They are characterised by specific technical, economic, social, political, cultural traditions and conditions, and we can recognise their features as those of the constructor. We recognise the act of constructing as deeply human, and subjective – or, to quote the initiators of the 2006 Cambridge congress: “We try to understand the way human beings have approached building”.²⁰ The French historian Lucien Febvre has expressed this approach perhaps more convincingly than anybody else in his inaugural lecture at the Collège de France in 1933: “History is the study of people, the study of our past – not the study of

things or concepts. Ideas stripped of the people who express them? (...) Institutions separated from those who create them (...)? No, there is no other history than that of people."²¹

We started out curious about the processes of constructing and now we have reached our destination: ourselves. Construction history is the challenge to meet people, constructors, to encounter *homo faber* again and anew. At this point at last we are also confronted with the genealogy of such central aspects of 21st century technical culture such as the quality of life, progress, identity, responsibility, and purpose.

The immediate result of this epistemological definition is the clarification of three aspects. Firstly, it is precisely because construction is much more than the transformation of theoretical knowledge into a functional product – however much this notion may have influenced the image of civil engineering in the 20th century – that the grouping around Patricia Redelet-Le-Grave and Edoardo Benvenuto who founded *Between Mechanics and Architecture*²² in the 1990s, touches the interest to construction history just on an exclusive field. Of course, mechanics is an essential reference point, so is architecture – just think about Schinkel's legendary quote "*Architektur ist Construction*"²³ – but construction is much more.²⁴

Secondly, in taking account of construction in its entirety, we find an interface, rather than a boundary, with the history of building; after all, the latter is the history of architecture in its entirety and as such has a particular responsibility to the architect. There is, however, a decisive difference between architect and engineer, and that can be expressed as the attention given to the process. *Cum grano salis*: The business of the architect is the product while the engineer attends to the process.²⁵ The historical blending between architectural product and technical process is the meeting point of the histories of building on the one hand and of construction on the other.²⁶

Thirdly, there is the unique potential to synthesise; this is the specific quality of construction history and primarily based on the focus on the intricacies of the construction process. Not only can we discard the much-lamented separation between architecture and civil engineering but also the generally accepted categories of a separate history for each of the faculty of technology/engineering, science and culture. Perhaps construction history can even be the prototype for the requirement, so concisely summarised by Febvre as early as 1933, that "continual negotiation of new linkages between similar or dissimilar academic disciplines, focusing the light of several heterogeneous academic subjects on to one object of enquiry is the most urgent and most fertile task for history today, a history frustrated by artificial boundaries and exclusions".²⁷

4 Subject and Sources: Objects of Enquiry

Any branch of history is an examination, first and foremost, of people: in this case master builders, engineers, researchers/academics, entrepreneurs/industrialists, brilliant mavericks, and respectable artisans. The subject matter consists of their utterances, their perceptions,

their attitudes, their organisation – their practice of construction in its entirety, the constant coagulation of a diversity of influences. Technology, science, culture, economics, tradition, politics, and an understanding of nature are compacted as if they were under a burning glass. It is for this reason that biographical research can be synthetic in an exemplary way. In the 1920s Albert Einstein was once asked if the world could be explained once one had a full and complete understanding and explanation of a speck of dust; the gist of his answer was: yes, of course. There is a similarity here with the constructor who holds the key to the understanding of the whole world of construction. Another similarity comes to mind when the recently deceased Scottish-American historian Gordon A. Craig defined historiography as “the study not of conditions, but of people operating in conditions” explicitly taking guidance from Thucydides, who described the pre-history, the causes, and the course of the Peloponnesian War around 400 B.C.²⁸ It is because construction history acknowledges human beings as one of its principal subjects that it activates and develops its own synthesising potential.

A second area of investigation is provided by the networks people form and in which they act, structures in which and between which construction happens, structures which influence civil engineering and which are influenced by civil engineering: companies, associations, universities/colleges, national and municipal administrations, and also, time and again, the military sector.

The third area encapsulates the sum total of the products of construction, be they designs, visions, theories, or regulatory systems; and of course, and first and foremost, buildings, the constructions themselves. It is through the focus on the individual building and load-bearing supporting structure that construction history positions itself within the context of the history of technology in general. The construction of a car is characterised by drawings, calculations, visualisations, publications, prototypes – the car itself, produced many thousand times following this process is only of subordinate interest. This is altogether different from civil engineering. Let us not be diverted by faint-hearted historical attempts at serial production. In general, in civil engineering the planning chain is completed with the construction of the prototype – which in addition is almost always different from its envisaged projection, because the last part of the creative process is construction, the act of building. In construction history the individual load-bearing supporting structure progresses to the principal epistemological object, precisely because it is the only one.

And what about the specific sources of construction history? “History starts from texts.” However simple and elegant Lucien Febvre’s methodological ground rule from the 1930s may be, it is insufficient in our case. Yes, of course, texts. But even the academic study of general history today uses other routes into history, and construction history in particular seeks its pictographs of construction essentially in the artefacts themselves, in the constructions and their substantiality. The buildings at the same time are both - the object of examination as well as the sources. The point is to read them. Simple, yet so difficult.

5 Methodology: Construction and Reconstruction

The concept of *Historische Bauforschung* ("Historical research into building") as a description of a methodological approach to these specific sources and resources was devised by German architectural history, in the knowledge that methodological elements of archaeology were being adapted here. This approach was developed by architects to distinguish historical research into building from the humanities, archaeology, and art history: its aim was to explain historical architecture from the point of view of its intellectual producers, namely its designers. Their epistemological interest extended from formal architectural aspects via construction and engineering to aspects of the social history of architecture and the city, research into historical building being both across time and interdisciplinary. This type of approach also contains great methodological potential for construction history as it allows for the formulation of its specific problems and objectives. For the archaeological approach to Construction History in the sense of *Historische Bauforschung* the single stone, the single bolt, the single piece of reinforcing steel, they all are regarded as the key to discover the stories behind - the process of design and construction in its individual uniqueness as well as its specific historical background.²⁹

A second specific methodological potential of construction history is to be found in the integration of approaches and methods in engineering science. In connection with traditional historical methods this methodological potential opens up unique opportunities for historical analysis and evaluation. For instance old structures can be comprehended and evaluated more clearly with today's modelling techniques and calculations in relation to fundamental criteria such as structural safety and risk. But above all, academic engineering competency can help to reveal, understand, and place contemporary modelling techniques and theories. It is an essential key to an understanding of historical construction. Without such a key, the analysis will often be unsatisfactory.

However, knowledge of engineering is neither a sufficient nor a necessary condition – more important, and perhaps even essential, is an affinity with the *eye of the constructor*. Paul Valéry, *poète-philosophe* of the early 20th century, emphasised this aspect in his fascinating studies on Leonardo da Vinci. He found the beautiful phrase the "joys of construction": "Those who have never dared to venture into the act of construction, already completed when others only begin to see it (...), those who have not seen a picture on a blank page, (...) and those who have not seen a non-existing building in the transparent atmosphere, those who have not experienced dizziness at the distance from a goal, (...) those do not know (...) the wealth and the abundance and the intellectual range, which illuminate the fact of construction. "³⁰

"To illuminate the fact of construction..." – where do we put the spotlight, though? Let us not kid ourselves. In the process of illuminating we are already constructing. Every history itself is construction. The piece of iron before us may have an objective quality but right from

the first time we notice it, we endow it with our own subjective meaning and that meaning will remain, will be irreversibly attached to it. "Let us not have any illusions," so Febvre warns, "people do not remember history but reconstruct it constantly." They "do not keep the past in their memory like the ice of the North keeps the mammoths of the Stone Age. They start from the present – and only through the present they recognise, they interpret the past."³¹ Valéry only grants the author the opportunity either to "experience" his hero or to "construct" him. In the former case, he ventures into "anecdotes, details, moments", in the latter there is an "implicit a priori acceptance of existence, which could be QUITE DIFFERENT."³² One can read Schinkel diagonally: Not only "architecture is construction" but "history is construction".

Practices Not Judgement

So, as unavoidably every reconstructed story is a construction of one's own take on a story, as tenacious it is accompanied by the constant temptation to develop it into the strategic narrative of the mighty stream rushing towards one's own position. The methodical imperative to thwart this temptation is relatively simple: Let us ignore progress, let us not disguise our views, let us approach history with deep humility. Let us read it anew, again and again, as effects of different practices of construction, as side-by-side, hardly consecutively. Let us acknowledge it as a strange world with enigmatic activities and practices – this is what people do, so writes Paul Veyne:³³ Let us read these practices in ever new diachronic periods, let us read them across history, across disciplines, across cultures. Let us place them in different contexts, and let us explain them in their assembled history.

But most of all: Let us not forget that history, its subject matter or its purpose, is not an exact science, but part of the humanities. This allows for some flexibility in written history and extends to questioning how research is to be reported. The great among historians, above all, have looked upon history as a literary discipline. They tell history with profound knowledge but in artistic form, liberated from what we commonly call academic style – as a novel, as an essay, as a children's book, as a film, playfully. The extent to which construction history is still in its infancy is revealed by the almost total absence of artistry and elegance of the kind exhibited in other branches of history right from their beginnings.

The literary approach is, however, not just an option of representing academic knowledge. It is knowledge itself, it is the key to an understanding deeper than academic study; it goes beyond and exceeds the boundaries of analytical-academic knowledge. Once we accept that we cannot but re-construct history constantly, it becomes obvious that this kind of approach is decisive, that it in fact determines history itself. That which we cannot grasp, remains a closed book. An academic analytical approach produces academic analytical history and that means that the part that is alive, the part of history that cannot be grasped by this means, is being discarded. In his masterpiece *Der Gegensatz* ("Contrast") Romano Guardini considers the limits of academic knowledge: "Only knowledge that can be formalised into concepts is academic knowledge. (...) Academic knowledge is the conceptual

understanding of objects by making judgements and drawing conclusions. (...) (Yet) the concept essentially points to the purely general, the abstract, the formal. (...) That which is alive, liveliness, remains inaccessible." ³⁴

Let us use as an example the difficult category of creativity in construction history, the "combination of inspiration and logic", ³⁵ tantalising at the same time as is it difficult. In his first essay on Leonardo, written as early as 1894 and bearing the programmatic title *Introduction à la méthode de Léonard da Vinci*, Valéry construes the master of the renaissance as the ideal genius, the personification of creativity absolute. "Leonardo's secret" was embodied in his ability "to find relationships between objects whose connection cannot be understood on the basis of natural law." Creativity means "to awaken from the slumber of a type of thinking which has continued for too long." ³⁶

Is it appropriate to make sense of this type of "creativity" by academic means alone? Guardini recommends, with reference to the epistemology of antiquity, a twin track approach which combines intuitive and rational knowledge, abstract conceptualisation and experiential, observational, creative efforts, an approach that does not regard practical intuition and abstract conceptualisation as opposites.³⁷ And Valéry too, the more he discovers Leonardo as an emblematic figure for the meeting of different spheres, the less willing he is to accept the simple incompatibility between art and science. He enters emphatically the "in-between region of the different spheres", to quote Mai Wegener, who recently wrote a beautiful short essay on Valéry, informed by the awareness "that the separation between the natural sciences and the arts can only be asserted from one vantage point, one which lacks the perspective on the process of formation but is only concerned with the end product. Rather than focus on the buildings (...) Valéry concentrates on the construction."³⁸ The process of formation and the process of construction: into what other direction could construction history be heading? It cannot help but venture to the margins of traditional academic methods, even if limited, for obvious reasons, to re-production and duplication, or to an immersion in places, to tracking and to tracing, to meditation. There are many kinds of approaches and knowledge waiting to be explored.

6 Programme: Histories make History

Just over quarter of a century ago, the Parisian philosopher Jean-Francois Lyotard published a paper which he regarded as an occasional piece. Essentially, it was intended as a straightforward report for the Canadian government, but *La condition postmoderne – rapport sur le savoir*³⁹ was soon to occupy a key position in the early stages of the debate around what we now call postmodernism. Not long after, it was published in German under the title of *Das postmoderne Wissen* (Postmodern Knowledge). The paper's detonating fuse lay in a radical

break, and in the intention, consistently developed, to “understand innovations in science and technology, in politics, in day-to-day life, and in the arts not only, as had been customary, as a progression of the project Modernity but as phenomena of a break with this project.

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Since then, the post-modern movement has matured to express a fundamentally changed perception of the world and its history and it now transcends all academic disciplines and boundaries. In the process of deconstructing modernity's programmes and ideals the great narratives of western thinking, in which past and present forever moved towards a concrete and better future, disintegrate: the Old and New Testament, the enlightenment, Kant, Hegel, Marx. Georg Mehrtens' history of German bridge construction in the 19th century was one of these great narratives which pledged salvation in the Promised Land with its message that the “great technical inventions” presented “this century with the blessing of labour and at the same time with the most reliable basis to become ‘*better and happier*’”.⁴¹

But a hundred years later there are no more promises of salvation, no more causalities, no more mechanistic pictures of an advance, no more predictability, no more prognoses, no more truths. The signs have been taken down; we stand, a little aimless, in the here and now, and we cut our cloth accordingly. Only a very modest and vague notion of uniformity and occasion remains of the way of the world and of history. Not much more yet. But it is precisely because of this that historiography is set to become exciting. The less we can make out a direction, the less we can anticipate the future, the more history gains; it will shine in renewed beauty as the great enigma, the puzzling mystery with no future.

What is the agenda for construction history in this postmodern age? As we have seen it always is a specific way of interpretation. History is interpretation or it is not history. That is the first point on the agenda. We put it under an obligation to refuse legitimization, a legitimization which perceives the present only as the future of history and distorts history to justify what is. That is the second point on the agenda. But there is a third point, old and simple, the agenda of all history. It still aspires to be an exhaustive inventory. This is utopia, never reached but always pursued: to transform all the layers of past events to history by writing them down.

Loss of being directed has far-reaching consequences for the inventory of construction history. If I were certain that crystals explained the world, I should collect crystals - if I were no longer sure, I should consider what else to collect. If history is no longer a stream with a direction but an ensemble, then its inventory must be opened to include the multi-layered, the opaque, the strange, the unexpected, the odd, and the forgotten. If there is no direction, it becomes the duty of construction history to focus on that which does not fit the discarded course of development – even if all we do is to stop measuring history by the familiar means of linking structural analysis and construction, engineering science and constructional engineering.

Never again the inventory will be the one great narrative. Construction history, too, will gain through an understanding that its richness derives from the many narratives, from narra-

tives which acknowledge otherness without intending to crystallise a main thread. New categories of diversity appear, cultures of constructing, screaming to be discovered and to be compared with all their implications, values which change from culture to culture and are neither right nor wrong.⁴² We encounter such outstanding beauty, such astonishing narratives, almost virgin territory – the history of construction as wide terra incognita. The construction history of our young century will again be, though different from 100 years ago, a history made up of many hi-stories.

7 What is the Significance of Construction History?

The audience gathered in the West Berlin lecture hall for the annual lecture of the *Deutsche Betonverein* (German Concrete Association) in 1971 were treated to a most interesting and reflective address by the historian Golo Mann, entitled “Can we still Learn from History?” His conclusion, reached by citing a great number of examples as part of his discourse, was the advice to approach history’s predictive potential with scepticism. Even then, he already perceived history primarily as “the surprising, the unpredictable”. For Golo Mann, it is rather particular basic attitudes we can learn from history: “It could be a teacher of modesty, an antidote against all kinds of fanaticism, against self-satisfaction, against black-and-white thinking, and dogmatism. This is what history could be.”⁴³

Yet, perhaps it teaches us something else. Of course, the solution to the problems of today cannot be found in another epoch. The crux of the matter is not the renewal of an old pattern of construction, a view, an attitude, or morality – but the appropriate transformation of these issues. It is not about the future – but about the present. The justification of current practice does not rely on the past – but the past does recover its genealogy. History, if read as such, as genealogy, is nothing but an analysis and critique of the present.

Construction history derives immense significance from this. If we focus on construction, in all its facets, and refrain from limiting ourselves to one culture or to one subject, while at the same time avoiding sinking in generalities, if instead we open up complex dynamic areas of enquiry which link several traditional cultures and disciplines – then construction history will unfold into narratives of finely differentiated construction languages. How can knowledge about diversity not be an enrichment for today’s construction practice? A practice which welcomes challenges, courageously questions current practices, and which develops optimal ways of managing and using materials. History as a productive force of a new way of building: from the archaeology of construction to the target of a new genealogical teaching of the act of construction is but one little step.⁴⁴

Here we find the first concrete level of significance, of how of construction history can enrich civil engineering. The second level concerns its inventory. There is no need to stress

that nowadays the field of handling with still existing buildings, the field of reconstruction and rehabilitation, is one of the largest parts of building activities. But an intelligent and appropriate intervention in existing structures is hardly imaginable without knowledge of the history of construction. It is a necessary condition for every present-day builder or designer who is concerned with our built heritage, be it in measuring and monitoring or restoring and reinforcing. Whether one works with the old or new – in both cases one needs history. All of a sudden it appears as a practical discipline. But let us not make the mistake of erecting a barrier between applied and “free” history as an either/or. The histories remain the same, and they always begin with the same aimless, curious, open, honest initial move.

Last not least there is a third level of significance which applies to construction history as “free” discipline, and this one extends far beyond the actual building sector. Let us assume we manage to develop construction history not only as narratives of our technological age but also as narratives of human civilisation. Let us assume we commit ourselves, irrespective of the imperative for absolute methodological honesty, less to the search for a truth in the dichotomic sense of right or wrong, but rather towards a truth in the sense of the humanities, of the people’s knowledge.⁴⁵ This would entail the chance to appreciate construction and constructional engineering anew, as technology *and* culture. Construction history would then open up as an epistemological medium for the highly technological world with its development over thousands of years, the world in which we live today and tomorrow – in which we are both allowed to live and obliged to live. Understood in this way construction history then turns to not less than a technical anthropology.

¹ Josef Durm: Zwei Großconstructionen der italienischen Renaissance. In: Zeitschrift für Bauwesen. vol. 37 (1887), p. 354-374, 482-500, Tfl. 43-46.

² Durm, Zwei Großconstructionen, p. 500.

³ Georg Mehrrens: Der deutsche Brückenbau im XIX. Jahrhundert. Berlin 1900, p.2.

⁴ Cf. e.g. Jean Baptiste Rondelet: Traité théorique et pratique de l’art de bâtir, 5 vols. Paris 1802-1817; Émiland-Marie Gauthey: Traité de la construction des ponts. Paris 1809-1813

⁵ Ernst Brandt: Lehrbuch der Eisen-Constructionen. Berlin 1871, p.VIII.

⁶ Günter Günschel: Große Konstrukteure 1. Berlin u.a. 1966, p.8

⁷ Hans Straub: Die Geschichte der Bauingenieurkunst. Basel 1949, many further editions and translations.

⁸ A topical analysis of the history of Soviet and Russian construction history in: Sergej G. Fedorov: Construction History in the Soviet Union – Russia: 1930 – 2005. Emergence, Development and Disappearance of a Technical Discipline. In: Malcolm Dunkeld et al (ed.): Proceedings of the Second International Congress on Construction History. Cambridge 2006, p.1093-1112. An expanded analysis leading up to a history of an overall construction historiography of the 20th century and its cultural, social, and societal determination would, in view of present-day developments, certainly be a valuable undertaking.

⁹ Patricia Radelet-de Grave / Edoardo Benvenuto (ed.): Entre Mécanique et Architecture. Between Mechanics and Architecture. Basel 1995.

¹⁰ Antonio Becchi u.a. (ed.): Towards a History of Construction. Basel 2002.

¹¹ Cf. e.g. with reference to the congress in 2000: Amparo Graciani Garcia et al (eds.): Actas del Tercer Congreso Nacional de Historia de la construcción. Madrid 2000.

¹² Santiago Huerta (ed.): Proceedings of the First International Congress on Construction History. 3 Bd. Madrid: 2003.

¹³ Santiago Huerta (ed.): Proceedings of the First International Congress on Construction History. 3 vols. Madrid: 2003.

¹⁴ Antonio Becchi et al (ed.): Construction History. Research Perspectives in Europe. Florence 2005.

¹⁵ Antonio Becchi et al: Construction History: The Genoa Meridian. In: Becchi et al (ed): Construction History, p.7-10.

¹⁶ David Cannadine: Engineering History, or the History of Engineering? Re-Writing the Technological Past. In: Transactions of the Newcomen Society 74 (2004), p.163-180.

¹⁷ Stefano F. Musso: „Construction history“ and „Construction of histories“. University education and the future of construction history. In: Huerta: Construction History, p.1509-1517.

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- ¹⁸ Cf. Werner Lorenz: Von Tugend, Verantwortung und Qualität - Rede gegen das Verschwinden des Ingenieurs. In: Bundesingenieurkammer (ed.): Ingenieurbaukunst in Deutschland. Jahrbuch 2001. Hamburg: 2001, p.112-121.
- ¹⁹ Rowland Mainstone: Reflections on the related histories of construction and design. In: Huerta: Construction History, p.49-60.
- ²⁰ This approach has far-reaching consequences; I am not sure about its significance myself. If we take the human dimension seriously and if we accept that the direction of "great" history is also and fundamentally dependent on individual personalities – this should, with equal validity, also apply to construction history. Does constructional engineering necessarily follow abstract laws of development or does the individual constructor influence its course? Would bridges made with pre-stressed-concrete look any different today had Eugène Freyssinet and Franz Dischinger not pursued this development so decisively? To my knowledge no one has investigated this aspect systematically.
- ²¹ Lucien Febvre: Ein Historiker prüft sein Gewissen (1933). In: Ulrich Raulff (ed.): Lucien Febvre. Das Gewissen des Historikers. Berlin 1988, p.9-26, here S.17.
- ²² Radelet-de Grave / Benvenuto: Entre Mécanique et Architecture. The problem of limitation becomes even more distinct, when Benvenuto formulates the objective of his Geschichte der Mechanik (first published in Italian, 1981): "(...) and its major aim is to explain the fascinating development of architecture (structural engineering) and rational mechanics in alternating stimulation: in this field, as well, the primacy of mathematical models and the role played by construction technology as 'an adjunct, not the master' will find meaningful evidences." (Edoardo Benvenuto: An Introduction to the History of Structural Mechanics. 2 vols. New York u.a. 1991, vol.1, p.13) It is obvious here that Benvenuto expresses fundamentally different views from for example Mainstone.
- ²³ Cf. the discussion in more detail in: Werner Lorenz: Konstruktion als Kunstwerk. Berlin 1995.
- ²⁴ Cf. with reference to this discussion in relation to constructional engineering e.g. William Addis: Structural Engineering: the nature of theory and design. Chichester 1990.
- ²⁵ Cf. Werner Lorenz: Brücken und Brückenbauer – Haltungen zum Konstruieren. In: Braunschweigische Wissenschaftliche Gesellschaft (ed.): Year-book 1998. Braunschweig 1999, p. 105-132.
- ²⁶ ... in differentiating thus it is inherent that the fuzziness of the historical conceptual development of "engineer" and "architect" will have to remain. In this connection, cf. the interesting papers in the "frontiers" of both disciplines as part of the current research project "Wissensgeschichte der Architektur", Max-Planck-Institut für Wissenschaftsgeschichte Berlin and Bibliotheca Hertziana in Rome.
- ²⁷ Febvre: Ein Historiker, p.18.
- ²⁸ Johannes Wilms: In Umständen. Zum Tode des Historikers Gordon A. Craig. In: Süddeutsche Zeitung No. 253 of 13.11.2005, p.13.
- ²⁹ Cf. e.g. Salvatore D' Agostino: Historical buildings as an archive of the material history of construction. In: Becchi: Towards a History of Construction, p. 369-376.
- ³⁰ Paul Valéry: Introduction à la méthode de Léonard da Vinci. 1894, 1933. German translation in: Karl August Horst: Jürgen Schmidt-Radefeldt: Paul Valéry. Leonardo da Vinci. Essays. Frankfurt am Main 1998, p.7-61, here p.40.
- ³¹ Febvre: Ein Historiker, p.20.
- ³² Valéry: Introduction, p.11.
- ³³ Paul Veyne: Foucault révolutionne l'histoire. In: Comment on écrit l'histoire. Paris 1979. German translation: Der Eisberg der Geschichte. Berlin 1981.
- ³⁴ Romano Guardini: Der Gegensatz. Versuche zu einer Philosophie des Lebendig-Konkreten. Mainz 1995, p.17.
- ³⁵ Bill Addis: Creativity and Innovation. The structural engineer's contribution to design. Oxford 2001.
- ³⁶ Valéry: Introduction, p.16, 18.
- ³⁷ Guardini: Gegensatz, p.20.
- ³⁸ Mai Wegener: Tout le reste est ... littérature. Valéry und die Frage nach der Wissenschaft. In: Trajekte. 3 (2003) No.6, p.39-43.
- ³⁹ Jean-Francois Lyotard: La condition postmoderne: rapport sur le savoir. Paris 1979.
- ⁴⁰ Lyotard: La condition, S.9.
- ⁴¹ Mehrtens: Der deutsche Brückenbau, p.1.
- ⁴² Cf. e.g. in the field of mechanical engineering Wolfgang König: Künstler und Strichezieher. Konstruktions- und Technikulturen im deutschen, britischen, amerikanischen und französischen Maschinenbau zwischen 1850 und 1930. Frankfurt a.M. 1999. also in.: Der Kulturvergleich in der Technikgeschichte. In: Archiv für Kulturgeschichte 85 (2003), p.413-435.
- ⁴³ Golo Mann: Können wir noch aus der Geschichte lernen? In: Deutscher Beton-Verein e.V. (ed.): Vorträge auf dem Betontag 1971. 1971, p.35-49, quote p.49.
- ⁴⁴ In greater detail: Werner Lorenz: Archäologie des Konstruierens. Eremitage, Walhalla, Neues Museum Berlin. In: Bundesingenieurkammer (ed.): Ingenieurbaukunst in Deutschland. Year-book 2005. Hamburg 2005, p.172-181; for the concept of historical-genetic statics (and historical-genetic theory of technology) cf. Karl-Eugen Kurrer: Geschichte der Baustatik. Berlin 2002, p. 455-459.
- ⁴⁵ It would be worthwhile to pursue the discussion on the category of truth, on the dialectic of subjective objectivity in the history of (constructional) engineering separately.