From Abstraction to Algorithm

The changing link between the idea and architectural representation through the digital turn

[theses]

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DLA thesis booklet
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Melinda Bognár
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ACKNOWLEDGEMENTS

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to my fellow citizens, colleagues, friends and family.

CONTENT

ABSTRACT

Architectural design is always influenced by the used technology. The digital turn induces changes in both the process of architectural design and creation. The available repertory of tools defines, limits and controls the development of the plan. There is no thought without form, which form can be linguistic, visual, or even algorithmic.

We are currently living in a transition period when our new tools are often used based on the logic of our previous tools. Although the digital turn not only appears as a change of tools, but also a logical shift in the creative process. As the industrial revolution introduced mass-production, and a design approach which sees creation from the perspective of the final form, in accordance with the logic of assembling layered structures from elements. This thesis seeks what the creative logic of the digital age is, and what its connection points are to the already known creative phenomena and modes of expression, following the process from the birth of the idea to its realization.

The motivation for the research stems from daily practical experience, seeing the struggle of creators designing software models of layered building structures, or rather the difficulties of realizing buildings modeled based on the digital logic of splines and unique shapes.

The triple unity of concept, communication and creation and the matrix of production eras provide the research framework. In this arrangement will be examined systematicly the relationship between language and architectural content, the relationship between the used technique and formal appearance, as well as the real and virtual dimensions of the architectural form,

At the same time, the dissertation serves as an imprint of the present age, where analog, industrial and digital devices shape the architectural plan together. The dissertation shows which communicational, representational and formal changes digitization shows in relation to the creations of the artisanal and industrial eras, and provides an overview of how these system-level changes appear in the different application methods of artificial intelligence.

SHORT SUMMARY OF THE DISSERTATION

The thesis builds up an analysis of the impact of the digital turn on architectural design in seven chapters. After an introduction on design theory, the analysis is grouped around the concepts of communication, technology, form and artificial intelligence, followed by a discussion and a conclusion.

In the course of the chapters, which are structured in layers, the three types of communication examined, natural, visual and formal languages, are transformed into three characteristic forms of the technical environment, the computer, the software and the algorithm, which are further broken down into three readings of artificial intelligence, in parallel with the analysis of the three forms of space that are simultaneously present in our time.

The thesis highlights the deeper connections between each of these phenomena. The chapter on communication explores the relationship between ideas and reality through forms of communication, examining the clarity with which modes of communication can express the designer’s ideas. The chapter on technology analyses the tools of the digital age, focusing on the different expectations that computer-generated designs can meet compared to the life of a hand-drawn creation. The chapter on form then shows how design is affected by premature visual representation, and how the perception of physical and virtual formal representations differs. Then, the main chapter on artificial intelligence presents three ways of interpreting and approaching artificial intelligence, with their potential architectural applications. In the penultimate chapter of the thesis, Discourse, a comparison is made between the ideas brought to life by abstraction and algorithm in physical and virtual reality. Finally, the conclusion summarises the thesis.

The dissertation also includes a detailed presentation of the master project based on the thesis criteria, a presentation of selected papers on the topic in the appendix, a portfolio and a short professional biography.

example

The evolution of the pen.
In the beginning, the penna, a writing instrument made from the wings of birds, was dipped in ink over and over again and became suitable for writing. Then the dipped metal pen showed a change in material, and the process of shaping was technologically the same. Subsequently, the fountain pen had a reservoir.

The major change was the ballpoint pen, which does not need to be filled and the ink is dispensed independently of gravity thanks to the ball. It is used to write with ink, its relationship with the pen is easily identifiable, but its application is different.

And if we go further, the writing machine or even the printer and the penna are the characters that remain in common.

1. THESIS

On the adaptation period

THE DEVELOPMENT OF THE LOGIC OF USE OF A NEW TOOL STARTS WITH THE MIMICRY OF THE USE OF THE ALREADY KNOWN TOOLS, UNTIL THE NEW TOOL HAS A PURE, COHERENT CREATIVE MODE.

At the moment, we often use our digital tools to the potential of an earlier technological era. One example is when an architectural design is processed in AutoCAD on a computer screen, but with virtually the same logic of paper and pencil. This transition often makes it difficult to clearly distinguish and examine concepts and phenomena. Therefore, when talking about digitalisation, it is important to clarify in advance what is a purely digital phenomenon and what is an imitation of industrial logic by digital means.

example

The standardising effect of the typewriter.

While handwriting is unique, misreadable, even a signature from the same person changes over time, a document produced by a typewriter is readable in the same way by all recipients.

2. THESIS

Communicating the concept and content of the work

// IN THE DESIGN PROCESS, WHERE THE MESSAGE IS NOT OVER-DEFINED, ABSTRACTION IS JUSTIFIED. THE COMMUNICATION OF ARCHITECTURAL THOUGHT IS BASED ON THE FREE ASSOCIATIONS OF THE RECIPIENT.

// THE THOUGHT CONVEYED BY ALGORITHMS IS DEFINED IN EVERY DETAIL AND ALLOWS THE PRECISE COMMUNICATION OF INFORMATION.

The language used in design [natural, visual, formal] shapes thinking through its logical structure and cultural content, thus influencing the architectural work as a whole. The content of the work, its structure, its spatial relationships, all reflect the way of thinking that the designer’s linguistic environment allows.

example

Eating a stew with chopsticks is difficult, not impossible, but it may not be the best tool for the job. And if you look at it, Asians don’t even eat stew. Their food is served in a format that is easy to eat with chopsticks. Whereas European food is served in a form that makes it suitable for further processing with knives and forks. Accordingly, the utensil determines the creation. Whether it is a dish or a house.

In our time, digitalisation has made it possible to use the same software and the same design environment everywhere. So it’s as if we now eat everywhere with chopsticks. We probably wouldn’t be shovelling much stew any more. And that’s what’s happening in design too, local specificities, cultural characteristics are becoming less and less observable, the characteristics of the software used are becoming dominant, and in doing so homogenising architectural designs worldwide.

3. THESIS

The digital communication and creation process

// THE NON-STANDARDISED CREATIVE ENVIRONMENT HAS LED TO THE CREATION OF MORE DIVERSE, CULTURALLY RICH ARCHITECTURAL WORKS WITH LOCAL CHARACTERISTICS.

// THE STANDARDISED TECHNICAL ENVIRONMENT HAS LED TO A HOMOGENISATION OF WORKS, A GLOBAL ARCHITECTURAL CHARACTER.

The technical framework of a given period influences and unifies architectural works in a particular way. The tools of the digital age have a significant impact on the communication of designs, their formal vocabulary and production technology.

example

The formal appearance of an object is determined to a maximum extent by the tool used to create it. For example, the appearance and structure of blown glass is different from that of drawn glass. With the former, there is a contingency involved in the creative process, while the later will bring a precisely predictable result.

4. THESIS

Forms of digital creation

// // THE ACCURATE, ACCESSIBLE, EXACT SHAPES OF PRE-DIGITAL BUILDINGS WERE REALIZED ONLY AT THE TIME OF THE CONSTRUCTION.

// WITH DIGITALIZATION, THE TRANSLATION OF THOUGHTS INTO A SPECIFIC FORM IS MADE POSSIBLE IN EVEN PRIMER DESIGN PHASES.

An architectural work can be virtual or real, but in all cases it is a complex reflection of the spirit of the times, of thinking, or technical possibilities. The simultaneous editing of designs, the phenomenon of teamwork, freeforms and file formats that can be exported and sent to production are all current features of digital technology. Therefore the perception of the buildings is also very different in the unbuilt stage, than it was before.

example

When an architect creates a visualisation plan using software in which the instructions are shaped by millions of individual clicks, he sees his own unique vision reflected in the plan. Conversely, if the algorithm generates the answer from the big data set based on a prompted instruction, the many individual ideas in the algorithm’s learning data set add up, and the designer may feel that what he sees on the screen is not exactly what his abstraction of individual archetypes would have created.

5. THESIS

Artificial intelligence

A KEY DIFFERENCES BETWEEN TRADITIONAL ARCHITECTURAL DESIGN AND AI ENHANCED DESIGN LIES IN THE LEVEL OF CONTROL. ARCHITECTURAL DESIGN SUPPLEMENTED WITH AI TAKES THE CONTROL TO A MORE ELEMENTARY LEVEL OVER THE DESIGN OUTCOME THAN THE DESIGN PRACTICE WE WERE USED TO BEFORE.

In CAD design, the new tool mimics the logic of the industrial age. Artificial intelligence is driving the emergence of a new digital creative logic, where the representation of an idea is now achieved by giving micro-level inputs without modelling.
The incorporation of AI into architectural design is a consequence of the development of digital technology and the language of communication. Its impact on architectural design ranges from the optimisation of technical parameters to the extension of architectural imagination to dream-like free associations. The statistical response based on globally available data is added to the individual designer's intent.

Created by Melinda Bognár
between 2019 and 2024