The Power of Interpretation: A Reflection on the Application of Parametric Programs and Artificial Intelligence (AI) in Teaching

Giulio Bettini, Ron Edelaar

How does architecture relate to technology?

Architecture is conservative. On the one hand, it follows a deliberate, slow, and traditional development process. This is directly related to the fact that construction itself and the durability of a building are long-term. On the other hand, the economic investments and risks are high in relation to the resulting returns—there is a certain caution and a need for the tried and tested. Other influences in architecture are the conventions of utilization[1] and the nostalgic view that architects have of their world. We look to old models and use references from examples built in the past.

Perhaps because the profession has existed for thousands of years, architects are very conscious of tradition. The tried and tested is good. We can only combine things in new ways. Experimentation is the exception rather than the rule.

To a certain extent, the circumstances of this profession shape the structure of thinking. Innovations or even technical revolutions are observed and followed with interest. However, they are not widely applied until years or decades later. For example, while the first CAD systems were developed in the mechanical engineering industry at the end of the 1950s, with the first applications appearing in the 1960s and a breakthrough in the 1980s, CAD

1 In housing, for example, the convention is still based on the petit bourgeois family apartment, which was common in the middle of the twentieth century. It is used in scaled variations for single and couple households (They make up around sixty percent of all Swiss households), although the forms of housing are very different.

programs were not widely used in architectural offices until the end of the 1990s.

Fig. 40: Ismaili Abdolrauf /imagine: turn the forest into a cinema crowd, projector light shines through, 2024. Generated with Midjourney.

It is therefore not surprising that architects in general have long been critical of the potential of new technologies. This is currently the case with parametric software and AI. In the Fall 2023 semester, we approached both tech-

nologies with students on the Constructive Design master's course as part of a classic design task. In this text, we take a closer look at the AI tools used during the semester.[2]

The value of playing, not learning

The profession of architect is multifaceted, complex, and deeply rooted in its culture. Put simply, it consists of technical and creative requirements. The technical aspect can easily be supported by digital development. Tools such as spreadsheets, CAD, etc. are now widely available. ChatGPT supports architects in their daily work by searching and understanding standards and laws or summarizing the content of meetings. AI-based applications will find their way here, making the profession easier, but not changing it significantly.

In relation to the creative part of our work, the approach and handling of digitalization is somewhat more complex. First, we need to have a rudimentary understanding of where creativity comes from. We need to look at our own perception and thought processes and start with the neurological characteristics of humans. With neuroscientist Prof. Dr. Dario Cazzoli from the University of Lucerne and the artist and architect Nicolas Feldmeyer from London, we ventured to compare so-called AI with human intelligence at the beginning of the semester. According to Cazzoli, there are obviously many differences. Perhaps the most important insight was that AI—despite the information base developed exclusively by humans—will never be able to understand the world in an anthropocentric way: data are processed as objective and not as related to human behavior. Although AI has the task of understanding human needs, it will not act within the human self-image, but will always respond to human perception from "outside." A reciprocal behavior would have to develop between humans and machines, similar to a symbiosis. In connection with his own understanding of creativity, Feldmeyer quotes the French poet and philosopher

2 In the context of parametric applications and their programming, we would like to make just one brief comment: the architect Steffen Lemmerzahl showed us in an exercise at the beginning of the semester that parametric programming with Grasshopper can simplify intellectual and drawing steps. In addition, there are now ways to make the manual part of the design process (floor plan design) much easier with the help of parametric controllers. This development is amazingly powerful and extremely quick to use—if you are prepared to have a certain affinity with programming.

Paul Valéry: "To see is to forget the name of what is seen." This implies that creativity can only come from an unbiased view of the world. Creativity is therefore closely linked to naivety.

Naivety is often successful in our profession, leading us to new, solution-oriented ideas rather than fear- or fulfilment-based ones. Chatbots or image generators are not interested in intellectual or emotional exchange. This makes the exchange one-sided and seemingly pointless for the design process. It is therefore primarily good for a kind of game. The most important difference between human thinking and AI at the moment (and for the foreseeable future) is that humans, as children, learn by playing, by experiencing, without having to learn. AI knowledge, on the other hand, is based on the clear learning task of acquiring as much information as possible.

As Marie-José Kolly observes: "From an evolutionary point of view, children are made to play. Playing means doing something with the environment and seeing how it reacts. Getting to know the world without a goal. Without wanting to learn." By contrast, "the machine lacks experience and therefore the knowledge gained from it. It lacks the context of world knowledge to be able to generalize what it has learnt more easily and more widely."[3]

With this in mind, we also learned from our students that chatbots and image generators are extremely knowledgeable, but can only help to a limited extent in finding and reflecting on ideas, narratives, and strategies for design. The exchange between colleagues is much more fruitful.

Interpretation and analogy

What can "intelligence" mean in the context of architectural design? As noted above, the term is closely linked to specific human characteristics and is difficult to define objectively, especially in the context of the creative activity of design. Dealing with the initial situation of a project can be seen as a fundamental process of contemporary design: location, program, framework conditions, and desires collide and must be synthesized by the architect in a project. Order is created through an (often personal) interpretation of these issues. Interpretation can therefore be understood as a form of intelligence. This process is profoundly human and therefore ambiguous: no theory of interpretation survives

3 Marie-José Kolly, "Der Wert des Spielens, des Nicht-Lernens," *Republik*, April 11, 2023. Authors' translation.

when it is enforced in a clearly defined discipline. The inescapable relationship between architecture and reality requires design interpretation to engage with real objects (utilitarian objects, architectures, landscapes)—and this is usually done visually. The image of reality therefore plays a central role, for example in the form of drawings, photographs, collages, or renderings. These means establish a relationship between what is depicted and what exists in reality (or its potential to take on such forms). What is defined in photography as a "trace of the real"[4] forms the basis of design interpretation and is therefore an essential part of architectural "intelligence." AI recognizes images merely as data sets, without understanding the connection to the objects depicted. Its results may seem "real," but they are not. In the words of artist Charlie Engman:

> AI is not intelligence. It does probability calculations. It doesn't understand what a horse is. It can only make inferences about what a horse might be. That's why AI images have these qualities of body horror … For this reason, the creative process of producing images with AI is more a form of curation than photography.[5]

The question arises: Could these "cracks" in the representation provide new starting points for design interpretation, rather than the depicted, non-realistic images themselves? Engman describes the phenomenon as an "uncanny valley effect"—a gap in acceptance because some elements are correct, while others appear in the wrong context (for us humans).

Beyond the image, AI is already being used to simulate design processes. However, these only seem to parameterize certain aspects of the process and do not (yet) reproduce the creation of designs from scratch. One reason for this is the human way of generating ideas that motivate design. One such process is analogue thinking.

An example of an AI-generated image created with the prompt "Imagine a hotel in Zermatt" illustrates this. Images associated with Zermatt often show sloping roofs and patterns of mountain chalets. So, the AI-generated image will contain these elements in unexpected combinations. Humans, however,

4 Philippe Dubois, "Die Fotografie als Spur eines Wirklichen" [1990], in *Texte zur Theorie der Fotografie*, ed. Bernd Stiegler (Reclam, 2010).

5 Adrian Kreye, "Gerade die Fehler sind schön," *Das Magazin*, no. 15 (2023): 20–27. Authors' translation.

work differently: without an immediately recognizable logic, they make personal connections. For example, a human might associate a design for a hotel in Zermatt with the "thin air" of the mountain village: the hotel could emanate a certain lightness through a reflective metal structure. The association could also be more figurative. The Matterhorn near Zermatt is notoriously difficult to climb; the hotel could thus be made up of small units connected at the corners, similar to a rope team of climbers. These striking examples could not be generated (without a data set of a previous human experience) by AI, and demonstrate that it is questionable whether (and how) AI can not only simulate the analogue thinking of individuals, but actually generate it. The psychologist Carl Gustav Jung described analogical thinking as "inexpressible in words,"[6] and the Italian philosopher Giorgio Agamben gets to the heart of the phenomenon when he writes: "In contrast to the classical alternative 'either A or B,' which excludes the third, analogy always asserts the third, its stubborn 'neither A nor B.'" [7] Oswald Mathias Ungers illustrates this in architecture:

> When Le Corbusier compared the building to a machine, he saw an analogy where no one had seen one before. When Aalto compared the design of his organically shaped vases with the Finnish landscape, or his design for a theatre in Germany with a tree stump, he did the same … The analogy establishes a similarity, or the existence of some similar principles, between two events that are otherwise completely different … In using the method of analogy, it should be possible to develop new concepts and discover new relationships.[8]

These observations highlight the challenges that AI still faces when it comes to replicating architectural design. It will not be enough to implement these processes in a deep learning model, as design processes are known to be fluid and change over time—a particularly human characteristic.

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6 "Logical thinking is thinking expressed in words that is directed outwards as discourse. Analogue or imaginative thinking is sensitive, figurative, and silent; it is not a discourse but a regurgitation of material from the past, an inwardly directed act. Logical thinking is thinking in words. Analogical thinking is archaic, unconscious, unspoken, and basically inexpressible through words." Carl Gustav Jung, letter to Sigmund Freud, in Vittorio Savi, *L'architettura di Aldo Rossi* (Franco Angeli, 1976), 112. Authors' translation.

7 Giorgio Agamben, *Signatura rerum. Sul metodo* (Bollati Boringhieri, 2008), 21; Valter Scelsi, *Osservazioni su architettura e analogia* (quodlibet Studio, 2022), 30. Authors' translation.

8 Oswald Mathias Ungers, *Morphologie: City Metaphors* (Walther König, 1982), 12.

Fig. 41: Charlie Flotho /imagine: abstract and hand-crafted architectural scale model of a BIG HOUSE, flying basketball yards, a public shower, and a hidden theater, black background, 2024. Generated with Midjourney

Generica and curation

Chatbots and image generators get their information exclusively from the web. They therefore have direct access to an unimaginable amount of existing, non-curated data. These programs are able to organize, filter, and categorize this knowledge in a very short time. The result is an answer to a question that is highly likely to be the right one. Answers from today's AI are therefore always "compliant" and never bold or daring. This programmed characteristic is ideal for scientific purposes, for example. By "calculating" answers from probabilities (with negligible variations) that always come from the same pool, they

create a limited, controlled reality. As Joseph Weizenbaum pointed out in the 1970s: "There is a danger of reducing reality to those aspects that can be processed by computers."[9]

Generic answers are not helpful to a creative activity because they do not produce "ideas." For example, if we look at oral histories, they never claim to be an exact account of what happened. They are retold and adapted according to each teller's view of the world. In the process, the stories are "polished," losing more and more of their temporality and gaining general meaning and relevance. In contrast to "static" information science, this state is dynamic. A dynamic always creates an imbalance.

So, progress is born of an imbalance, a dream, a hunch, a need. We call this an "idea." The realized idea always continues to write our cultural history. In the assignment for the semester, we wrote:

> An idea often overlaps various familiar or common themes. Looking at this overlap is crucial! What may at first seem like a mistake or something useless has potential. The important thing is not to shy away from these discoveries or simply dismiss them as mistakes, but to be brave and go down this road.

Image generators such as Midjourney also produce such "overlays"—as described above—when sufficiently contradictory or surreal conditions are formulated in an assignment. When asked by a student to visualize proposals for "a school complex in Zurich used as a community center with a gym as a theater," the image generator responded with a series of images with collage-like overlapping typologies. It seemed as if the AI was desperately trying to create a convention out of the brief. Reflecting on this collage in the studio was more productive for further design than the generated proposal. It is quite possible to create surprising images with AI. In contrast to the search for architectural references, the generated images function more metaphorically. However, the metaphor itself is part of the playfully learning human.

9 Joseph Weizenbaum, *Computer Power and Human Reason: From Judgment to Calculation* (W. H. Freeman and Co., 1976).