Architectural Intelligence in the Age of Artificial Intelligence

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> ARCHITECTES: Tous imbéciles. Oublient toujours l'escalier des maisons.[1]—Gustave Flaubert

The surface of depth

It is no surprise that the recent rise of Generative AI tools has been enthusiastically received by the public. Tools such as Midjourney and Dall-E have opened the possibilities for almost everyone—the digital divide notwithstanding—to create worlds and to visualize ideas and concepts. Meanwhile, ChatGPT and other tools based on large language models (LLMs) have introduced new ways to express and conceptualize complex discourses. At first glance, these new possibilities seem extremely democratic, as such tools were formerly restricted to specialists like architects and writers. Not least because of these new possibilities to create three-dimensional worlds, architects, like many other professions, have seen their expertise jeopardized. However, there is much more going on beneath the surface of these tools that concerns not just architects.

It might not be a coincidence that the metaphor of "depth" appears so often in this context, as evidenced by the name of the latest tool to attract public attention, Deep Seek AI, which goes along with the already existing DeepL, DeepAI, and the notions of Deep Neuronal Networks (DNN) and Deep Learning. As a metaphor, "depth," standing for the incommensurable, has a long tradition. One could refer for example to Honoré de Balzac's comparison

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[1] "Architects: all idiots. Always forget the stairs." Gustave Flaubert, *Dictionnaire des idées reçues* (Éditions Conard, 1913), 6.

of nineteenth-century Paris with an ocean, whose depths are inscrutable.[2] This obsession with depth in the context of AI is symptomatic of a desire to leave certain things in the shadows and to suggest that "intelligence" is not just simulated but "real." Before the emergence of AI, the discourse around the world wide web was similarly accompanied by metaphors of depth and obscurity, as for example in the terms "deep web" or "dark net"; intriguingly, AI tools are dependent on the web, predating it massively for data along with all types of databases. While AI is often conceptualized through biological metaphors—the brain, neuronal networks, etc.—the metaphor of depth is a spatial metaphor that helps to conceptualize the shady side of AI, which has less to do with the tools themselves than how they are used to create, in the words of Matteo Pasquinelli, a "planetary business of surveillance and forecasting."[3] Again Pasquinelli warns us that "the problem of AI has nothing to do with intelligence per se but with the manner in which it is applied to the governance of society and labor via statistical models—ones that should be transparent and exposed to public scrutiny."[4]

The opacity of depth resonates with the pretended transparency or even invisibility of technology, creating an interesting chasm between what we do not see because it is so pervasive—transparent—and what we do not see because it is overtly complex—the depth. Martin Heidegger warned us as long ago as 1953 that technology should not be considered a means, and that both accepting or negating it would make us its slaves, while considering it as something transparent would make things even worse.[5] The transparency, or even invisibility, of technology is only dissolved when the technology is not working and we cannot perform our tasks, at which point it becomes visible. This transparency is often a consequence of the narratives of efficiency surrounding AI. And invisibility, as Eduard Kaeser suggests, is a signum of power.[6]

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2   "Mais Paris est un véritable océan. Jetez-y la sonde, vous n'en connaîtrez jamais la profondeur." Honoré de Balzac, *Le Père Goriot* (Revue de Paris, 1834–5), ch. 3, 14.

3   Matteo Pasquinelli, *The Eye of the Master: A Social History of Artificial Intelligence* (Verso, 2023), 12.

4   Matteo Pasquinelli, "How a machine learns and fails: A grammar of error for artificial intelligence," in "Spectres of AI," ed. spheres Editorial Collective, Maya Indira Ganesh, and Stina Lohmüller, special issue, spheres, Journal for digital cultures, no. 5 (2019): 3.

5   Martin Heidegger, "Die Frage nach der Technik," in *Die Technik und die Kehre* (1953; Klett-Cotta, 2002), 5.

6   Eduard Kaeser, *Trojanische Pferde unserer Zeit. Kritische Essays zur Digitalisierung* (Schwabe Verlag, 2018), 28.

Alongside the "conceptual" depth of AI, there is also a "physical" depth we should not forget: the whole infrastructure of AI and the corresponding energy demand, carbon emissions, and water for cooling data centers, which are often overlooked. The invisibility of technology often makes its relation to the "ground" equally invisible.

Before talking about intelligence in the context of AI—and architecture—it should be made clear that this is not primarily a technological problem, but a social and a political issue—and here we have the first connection with architecture, a social and political discipline par excellence. But to understand this extended dimension, we must also comprehend the technological dimension which makes any reflection about AI so challenging, as most of us cannot understand what is going on from a technical point of view.

In order to describe the all-encompassing nature of modern technology the term "technocene"[7] has been coined, adding to the existing monikers "anthropocene"[8] and "capitalocene."[9] AI comes with a promise of totality and a model of knowledge that is contained and finite because it is computable, but as architectural historian Werner Oechslin has underscored, science is never finite and deals with the unknown, not with the known.[10] This all-encompassing nature of AI is very problematic, because it bridges everything through data—science, society, politics, economy—and at the same time flattens all differences and frictions. It is from this perspective that the abhorrent term "generative management" emerged, an oxymoron that aptly captures the paradoxes of our time. In this context, Orit Halpern and Robert Mitchell have introduced the notion of the "smartness mandate" to describe the imperative which comes alongside any AI narrative, that is to "become smart or else go extinct as a species."[11] Smartness—as in smart phones, smart cities, etc.—is an epistemology, "that is,

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7   Clive Hamilton, François Gemenne, and Christophe Bonneuil, eds., *The Anthropocene and the Global Environmental Crisis: Rethinking Modernity in a New Epoch* (Routledge, 2015).

8   Paul J. Crutzen and Eugene F. Stoermer, "The 'Anthropocene,'" *IBP Newsletter*, no. 41 (2000): 17–18.

9   Jason W. Moore "The Capitalocene, Part I: on the nature and origins of our ecological crisis," *The Journal of Peasant Studies* 44, no. 3 (2017): 594–630.

10   Werner Oechslin, "Ungewissheit, die einzige Hoffnung," Scholion: Bulletin 16 (2004): 5.

11   Orit Halpern and Robert Mitchell, *The smartness mandate* (MIT Press, 2022), 220.

a way of knowing and representing the world so that one can act in and upon that world."[12]

Beyond the usual critical voices, AI and its potential to change science and society are greeted with enthusiasm. This condition is the more surprising if we consider the vast history of the critique of technology and of future optimism, not least following the horrific consequences of the atomic bomb. One has only to think of Husserl's *The Crisis of European sciences and Transcendental Philosophy* (1936) or Adorno and Horkheimer's *Dialectic of Enlightenment* (1947), the former deploring the growing estrangement of human beings from the world and the latter describing how the promises of the Enlightenment have opened the way to political totalitarianism. And this is all the more relevant, as AI nowadays is becoming almost a cult, posing a fascinating paradox, as highlighted by Eduard Kaeser: while the Enlightenment and modern science fought against any form of devotion and superstition, AI and its algorithms are gaining an almost mystical aura.[13] More than ever, we need a critical stance that acknowledges the potential but also the pitfalls of the new technology and new world paradigm. This book is a step in that direction.

Architectural intelligence

Beyond the *depth* of AI, there is the *superficiality* surrounding the notion of intelligence. In the context of AI, the term "intelligence"—as is generally known, initiated by the Dartmouth Conference in 1956—is rather misleading. Human intelligence still goes beyond the comprehension of the science studying it[14] and the brain-computer metaphor, though still fashionable, has lost much of its appeal because it is rather shortsighted. However, AI indeed plays an "imitation game," mimicking human mental processes while expanding them to sometimes unexpected results. For this reason, and for the sake simplicity, in this book we still want to keep the notion of "intelligence" at the forefront of our

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12   Halpern and Mitchell, *The smartness mandate*, xi.

13   Kaeser, *Trojanische Pferde unserer Zeit. Kritische Essays zur Digitalisierung*, 39.

14   "Few constructs are as mysterious and controversial as human intelligence. One mystery is why, even though the concept has existed for centuries, there is still little consensus on exactly what it means for someone to be intelligent or for one person to be more intelligent than another." Janet E. Davidson and Iris A. Kemp, "Contemporary Models of Intelligence," in *The Cambridge Handbook of intelligence*, ed. Robert J. Sternberg and Scott Barry Kaufmann (Cambridge University Press, 2011), 58.

discussion. We believe that the cross-mapping of "artificial," "intelligence," and "architecture" is fruitful for a theory of architecture and AI. Architecture has seldom been discussed in terms of intelligence, but as many of the essays in this book reveal, this appears to be a useful strategy to understand the implications of AI for architecture. Considering Howard Gardner's "theory of multiple intelligence" (1983), it is eminently possible to assume a specific intelligence for architects at the intersection of different types. This is in spite of the ironic quotation by Flaubert at the start of this text, which suggests that from the outside, people might believe that we architects lack such intelligence altogether.

Depth and surface are spatial metaphors, and built and imagined spaces are clearly at the core of architecture. Probably the most irritating thing about Midjourney images is that although they simulate space, they are clearly "flat" and not architecture. It is here that the expertise of architects remains vital. Architects have a specific spatial thinking that helps them to design spaces and navigate into these. Without this spatial thinking, spaces remain empty containers without meaning. And it is through space that architects are part of the form-giving process of society, culture, and politics.

What architects must learn—as many essays in this book discuss—is how to deal with these new tools and the possibilities they open. As Lidia Gasperoni argues, they call for a new form of agency, and a new "experimental user" and performative practices.

Even though architects have always been quite critical of technological transformations, the discipline has nonetheless absorbed many revolutions, as for example Alberto Pérez-Gomez has recounted for the profound transformation of architecture during the Enlightenment.[15] Yet architects have always found a way to recast tools against their intended use. Even Gottfried Semper revealed a certain interest in science and computation in his *Entwurf eines Systemes der vergleichenden Stillehre* (1884), where he made a quite astonishing reference to mathematics, describing the possibility to define an artwork through a function of the type Y = F (x, y, z, etc.), only then to discard the possibility that reflection and calculation could replace talent and natural taste. In his words, he made use of this comparison only as a "crutch."[16] What appears new in the context of AI is that many tools are not only biased by the type of data they digest, but resistant to any use beyond the intended one.

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15   Alberto Pérez-Gomez, *Architecture and the crisis of modern science* (MIT Press, 1983).
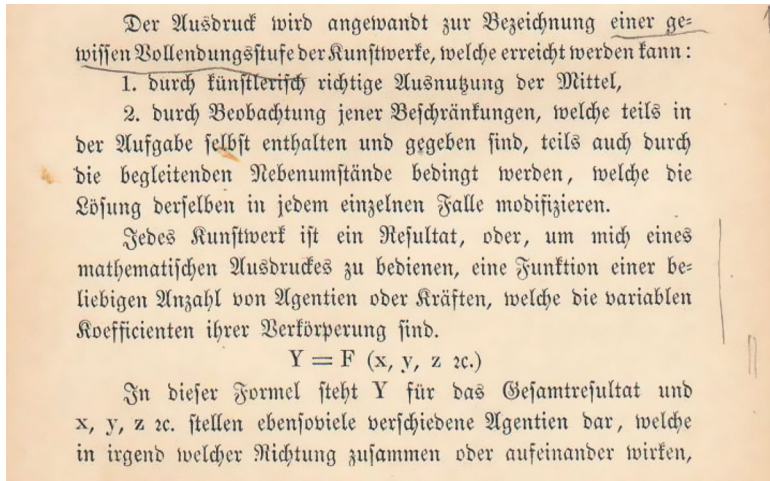
16   Gottfried Semper, "Entwurf eines Systemes der vergleichenden Stillehre," in *Kleine Schriften* (W. Spemann, 1884), 267–68.

With AI tools, there is a tendency to quantify architecture through the black box of certain programs, to automatically resort to a solution that is "good." This happens, for example when architecture is judged under the conditions of ecology and thus made to quantifiable parameters such as CO_2 emissions or embodied energy.

Fig. 1: Werner Hofmann, cover of the magazine "Aktuelles Bauen,"
January 1979

Fig. 2: Gottfried Semper, Entwurf eines Systemes der vergleichenden Stillehre, 1884, 267

The point where AI and architectural intelligence diverge the most is in the absence of a sentient body for the former. Architecture and architectural theory have traditionally included—or explicitly rejected—the body as datum from which space is experienced.[17] Science and philosophy have debated the relation of body and mind and the possibility of thought without body for centuries. Whatever AI will generate, it will not come from some social/physical body and its interactions with the world, which on the contrary is fundamental for architecture and the spatial interaction/experience.

In that sense one can conduct a riveting experiment with AI. When prompted "what is the body of artificial intelligence," Midjourney will symptomatically deliver the image of a head without a body, as if cognizant of its own shortcomings. Prompting the same in ChatGPT generates the following answer (with "body" in brackets in the original):

The 'body' of artificial intelligence (AI) can be understood metaphorically or in a technical sense, depending on the context.
Metaphorical Body:

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17   Harry Francis Mallgrave, *Architecture and Embodiment: The Implications of the new sciences and humanities for design* (Routledge, 2013).

In this sense, the 'body' of AI could refer to the way AI interacts with the physical world or how it performs tasks. For example, in robotics, an AI system might have a physical 'body' in the form of a robot that can move, interact with its environment, and execute tasks based on the AI's processing. The body here represents the tangible or mechanical form in which the AI operates.[18]

Fig 3: Midjourney, prompt: "What is the body of artificial intelligence," 2024

If one goes further and specifically asks how AI senses the world, the answer is equally interesting (again, "sense" in brackets in the original):

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18   ChatGPT, March 15, 2025.

> Artificial intelligence (AI) can 'sense' the world through various **sensors** and **data inputs**, which allow it to gather information from its environment, similar to how humans rely on their senses (sight, hearing, touch, etc.). The process of sensing in AI involves different technologies that enable AI systems to perceive, interpret, and respond to the data around them.[19]

AI thus suggests that it can overcome the absence of a physical body with a plethora of data and sensors that allow it to "experience" the world.

Desperately seeking theory

With this book we want to conceptualize AI in the context of architecture. That is, we want to establish theories—plural—that can help us to understand the multiple implications of architecture in this regard. To talk about theories in this specific context might appear outdated, at least in the classical Greek tradition of the word, where the *theoros* is just an observer. The literary critic Terry Eagleton famously declared in 2004 that "the golden age of cultural theory is long past," referring to theories from structuralism, poststructuralism, and postmodernism.[20] It is interesting that while few of the great thinkers of this "golden age" managed to remain relevant—we are thinking here in particular Foucault's concept of "biopolitics" or "governmentality"—authors such as Jean Baudrillard and Jacques Derrida are returning prominently to the stage and in contemporary discourse. Why not discuss, for example, the absence of authorship in AI tools with Roland Barthes' theory of the "death of the author," or the suppression of any disciplinary peculiarity with Derrida's theory of *différance*? Does Baudrillard's apodictic analysis and forecast about a world made only by "simulacres" not resonate with our present condition (a reference made by others in this book)?[21] The appeal these theories offer in this context resides not least in the fact that they are not classical theories, but hybrids. Falko Blask, for example, describes Baudrillard's theory as a "fictionalized theory."[22] Already, then, these authors experimented with new hybrid forms of theory to cope with the complex reality. We might need such hybrid theories to be able to grasp AI,

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19   ChatGPT, March 15, 2025.
20   Terry Eagleton, *After Theory* (Penguin, 2004).
21   Jean Baudrillard, *L'échange symbolique et la mort* (Gallimard, 1976).
22   Falko Blask, *Jean Baudrillard zur Einführung* (Junius, 1995), 10.

which, as Elena Gavagnin describes in her essay, "can feel like trying to catch a slimy fish that keeps slipping when gripped, leaving you with only buzzwords in your hands."

But we might need go one step further, as theories nowadays seem not only to be outdated, but have been supplanted by simulations. As Eduard Kaeser ironically asks: why turn to the painful and "useless" path of theory when we have efficient means of prediction?[23] Martin Warnke and Anne Dippel have recently highlighted that our worldview, once based on evidence, laws, and principles, is now profoundly shaken. Flagging ideologies and weak theories have taken their place in a bottomless deconstruction of the world derived from algorithms.[24] One of the main problems with these simulations is that they are based on speculations and as such never fail, unlike theories.[25] AI indeed suggests a flawlessness which is disconcerting and false, as theories always fail and need to be reformulated, updated.

That said, we need a new form of theory that is operational and creates its own simulations. The *theoros* cannot longer be an observer but must become an actor interacting with AI and the world. We need to develop a "performative" use of the medium capable of destabilizing and transforming representational practices (see the essays of Lidia Gasperoni and Darío Negueruela del Castillo and Iacopo Neri in this volume). We need to develop specific and new forms of AI literacy, where we define ourselves on what knowledge this is based upon and how we can gain it. Doing so will probably keep us busy for several years.

Structure of the book

With all this in mind, we invited a series of authors—architects, historians, philosophers—to help to develop such theories and to better understand how AI could be used, and to what extent this will influence and change our practice.[26] The authors reveal different gradients of engagement, enthusiasm, and

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23   Kaeser, *Trojanische Pferde unserer Zeit. Kritische Essays zur Digitalisierung*, 113.

24   Martin Warnke and Anne Dippel, *Tiefen der Täuschung. Computersimulationen und Wirklichkeitserzeugung* (Matthes & Seitz, 2022), 12.

25   Warnke and Dippel, *Tiefen der Täuschung*, 15.

26   The book has its origins in a conference we (Andri Gerber, Michael Mieskes and Atalay Franck) organized on May 3, 2024 at the ZHAW in Winterthur. Based on the findings and discussions of the conference, we invited the speakers, along with some additional experts, to contribute an essay to the volume.

criticism regarding AI as well as a more or less "conservative" view of architecture, and it was very important to us to represent this diversity in the book. The *depth* of their reflection also varies along their implication or critical distance. Ultimately, we are talking about something that is still in the making, but which, exactly because of this inchoate state, we might still be able to influence.

This introduction represents the first of four parts. In the second, titled "Fundamentals," we asked four non-architects to set the ground for the book. All four define boundaries and differences between AI and human intelligence/creativity.

Elena Gavagnin, a researcher and lecturer specializing in AI, data science, and computational astrophysics, introduces the concept of intelligence and how this is reflected in AI. She highlights shortcomings and differences, in particular how different learning modes blend in humans and not in AI, and how our physical presence is a fundamental aspect of human intelligence.

Further on, two philosophers, Dieter Mersch and Christian Georg Martin, contextualize AI in a broader history of intelligence, with particular focus on the role of creativity and thinking.

Against the backdrop of the history of computer art, Mersch makes the point that in the discussion of current AI-generated art, creativity and randomness are often confused. What we are missing in AI is an epistemic added value that makes the incompatible or the incommensurable significant. Creativity implies a "thinking of its own," which cannot be replicated by AI. AI will thus never be able to be "creative" in the terms defined by Mersch. Martin comes to a similar conclusion through another path and with a more general focus. The point of divergence he identifies between AI and human intelligence is in the role of concepts and conceptual activity which will never be comparable. Once we understand that AI is a tool, the main question is how to differentiate between use and abuse, and how to avoid the latter. The answer implies a use that allows us to improve and not to delegate our intelligent activities.

The last essay of this section is by artist and media theorist Michael Mieskes, who builds a bridge between philosophy and architecture by confronting—which might initially sound bizarre—baking and building. His point is indirectly also about use and abuse: AI should be there to expand our realm of experience, and not to lose contact with our environment. In his essay, he defines the terms by which we can discuss and approach AI in the context of architecture.

The third part is made up of two interviews. In the first, architectural historian Mario Carpo makes a plea for a return to the classical tradition, which was based on copying, much like AI today. That is, while we are all focused on looking forward into the future, we should instead look back at our history and learn from it.

In the second, visual artist Philippe Schaerer shows us, through the lens of his long expertise on reading and making digital images, how to better understand the images created by AI. AI tools in his understanding are useless without an author that comes with an idea or concept that AI would never be able to produce on its own initiative. Schaerer's own form of creativity will always be dependent on a human being. At the same time, reflecting on his own work after AI, he admits it has lost some of its artisanal practices and turned into a more curatorial stance.

Both Carpo and Schaerer stress the importance of teaching younger generations a critical approach to data and images, as they often lack a certain historical and cultural background.

The fourth part is the most substantial and divides the essays along four subjects: data, media and representation, practice, and teaching.

The first section tackles the fundamental question of what the data of architecture can be. If the answer is plans, elevations, sections, diagrams, and renderings, another question arises: How do we digitize this data, and how do we make the complexity of information contained in it accessible and translate it to CAAD? If the problematic bias[27] related to a certain type of data is well known and utterly problematic in replicating certain prejudices, what will be the bias of specific architectural data that can be found online?

Julia Krasselt, a linguist and professor for methods of language data analysis, discusses in her contribution one specific form of data—language—in the context of AI. Based on word embeddings, she presents the preliminary results of her research on the language of architecture, based on three Swiss architectural magazines published between 1977 and 2021.[28] Not only does she show the potential of such an analysis of a large corpus, but also the extent to which language and architecture are interrelated and the former can determine the latter. The "data" as such is not simply a representation of something, but itself

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27   Joy Buolamwini, *Unmasking AI: My mission to protect what is human in a world of machines* (Penguin, 2023).

28   Julia Krasselt and Andri Gerber, "Sprache konstruiert auch etwas," interview by Tamino Kuny and Marcel Bächtiger, *Hochparterre* 3 (2025): 20–25.

influences architecture. Language cannot be thus considered neutral data for architecture. This reveals how complex and far from univocal the relationship between data and output is.

Based on examples from their teaching and research, Bige Tunçer and Cem Ataman discuss data-driven approaches in urban design and planning and the tension that results between the rich cultural, political, and historical tradition of urban environments on the one hand, and the uniformity that comes along with standardized data practices on the other. While acknowledging all the advantages that the integration of multi-modal data can bring for the practice, this calls for a paradigm shift, from data-driven design to design-driven data. The consequence would be a new "symbiotic relationship between intelligent workflows and human expertise"; that is, a new relationship between designers and AI tools. Urban design has to remain human-centric and data can help in this, by supporting "context-sensitive decision-making."

Darío Negueruela del Castillo and Iacopo Neri discuss how, in the context of the collective imaginary of urban environments, AI creates a digital shadow of these environments, which takes the place of the "real city" and of anything local and specific. This digital shadow is both the result of the "surplus data" and of "data colonialism." What appears to be an extension and an opening of reality is, rather, creating a closed system. Negueruela del Castillo and Neri make reference to three of their own projects based on AI-models, which allow them to engage with this reality and to render the contradictions of urban knowledge visible. Furthermore, the projects reveal the strongly political dimension of "urban AI." For them, this calls for an extension of the "right to the city" described by Henry Lefebvre to a "right to the algorithmic city," implying that we do not have to abandon computational tools, but work with them to create a more inclusive and open "reality."

The second section revolves around the mediality of AI and the relation of input, output, and representation. While AI is often described as a black box—a rather old metaphor—it displays a particular relationship between production and reproduction which appears to be quite new. AI tools are based on the reproduction of data and learning processes, but this reproduction seems to be at the same time a process of production, creating an interesting hybrid where the two are no longer clearly distinguishable. AI not only replicates data, but transforms it, creating a result which is strictly speaking the reproduction of these data. As a medium, it has a strong impact on the data and their transformation.

In the first essay, architect and researcher Roberto Bottazzi discusses the impact of "Deep Learning Models" (DL) on the practice of architecture and how these models transform the site of the user's agency from the process to the output, thus rendering the user a sort of curator. While designers in the past were acting upon the processes and could design/code them, with AI, they can only intervene upon input and/or output. With reference to his own teaching, Bottazzi pleads for a new strategic use of AI and a corresponding digital literacy which should allow boundaries to be broken and the limits of the influence of AI to be redrawn. Architects then can overthrow a passive posture and create an urgently needed "conceptual agenda for architecture."

The second essay, by philosopher and architectural theorist Lidia Gasperoni, starts from the question of how AI influences human interactions and the general experience of the world. To overcome the technological determinism of AI, Gasperoni postulates the need for new experimental practices and an experimental user, capable of introducing a performative use of the medium. These experimental practices have the potential to open AI as a medium and to introduce a counter-use of the technology.

The third section is the most "practical," as it approaches the question of how AI will impact the discipline and the practice of architecture. Here, four architects share their insights on how AI has impacted their work.

Architect and urbanist Stefan Kurath takes a mostly theoretical stance. He underscores how architecture is often oversimplified by excluding the complex production conditions which make every project something unique and hardly reproducible. As a consequence, he makes the case for a theory of architectural practice as a starting point for any discussion about AI's impact. He furthermore points out that data in architecture is always based on the known, and this known is what led us to all our contemporary crises. An AI-influenced architectural practice based on this data will thus only replicate them.

Adam Kiryk is Head of the AI Unit at Penzel Valier. In his essay he retraces the introduction of a newly created "AI-Unit" at Penzel Valier and describes the impact of the introduction of several AI tools in the office, in particular those based on LLMs. His experience in this sense is thoroughly positive, as these tools became "creative dialogue partners" for the employees of the office. The role of the architect then shifts from a *creator* to a *curator* of AI-generated ideas. Based on this experience, Kiryk argues that AI will be more of an evolution than a disruption.

Christoph Geiger and Clemens Lindner, both working at Zaha Hadid Architects (ZHA)—a practice at the forefront of digital architecture—underscore

in their essay the huge potential of Generative AI, but at the same time warn about its present shortcomings, such as the absence of structured and labeled datasets and of a unified computational framework. To really progress in this domain, for Geiger and Lindner, there is the need for an independent architectural research ecosystem to ensure the advancement of the discipline.

The final section is dedicated to teaching architecture through and with AI. The approaches here could not be more different, while both remaining critical.

Giulio Bettini and Ron Edelaar describe in their essay a teaching experiment they introduced at ZHAW in 2023, which was accompanied both by the use of different AI tools and a theoretical framing of the phenomena through the inputs of a series of experts. The paper neatly sums up all the aforementioned differences between AI and human intelligence. Bettini and Edelaar underscore the human power of interpretation in the context of architecture, but also of experimentation, play, and even naivety. They describe a thought experiment comparing how AI and an architect would react to a specific task, and the result is quite revealing of the differences. As a conclusion to their teaching experiment, the reflection on what AI does and how it functions was more fruitful for the teachers and students than what it actually produced, as this also allowed them to reflect upon architecture and its conventions.

In the final essay of the book, Immanuel Koh describes his Codeless Studio in the context of the famous Paperless Studio, a didactic experiment by Bernard Tschumi in the mid-1990s at Columbia University. But as much as the Paperless Studio was not about getting rid of paper altogether, the term "codeless studio" is more of a conceptual provocation that describes the work with the new AI-native designers where coding will not completely disappear. Koh describes several experiments brought forward with students in the Spatial Design Studio and the theory of "neural tectonics" that emerged from these experiments. AI then becomes a tool that shapes "creatively desirable AI weirdness" and can be used also against its initial intentions. Once more, this calls for a critical embracing of AI, not least in order to understand its limits and potentials.

Engage with new forms of performative praxis. Open the closed box of AI and remain critical. Acknowledge the political dimension of AI and develop

counter-practices. These are probably the most important takeaways from this book. The future will tell us to what extent this was possible.[29]

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29   The authors would like to thank Tim Kammasch for his constructive criticism of this essay.