«What is this chair? Is it a sculpture or a piece of furniture, an architectural model, or even an architectural fragment in the scale one to one? Is it a prototype for mass fabrication? An experiment? Or a manifesto?»

PRINTED MATTER
Philip Ursprung

Philip Ursprung, geb. 1963 in Baltimore, Maryland, ist seit 2011 Professor für Kunst- und Architekturgeschichte an der ETH Zürich und seit 2017 Vorsteher des D-ARCH. Er studierte Kunstgeschichte, Geschichte und Germanistik in Genf, Wien und Berlin, wurde 1993 an der FU Berlin promoviert und habilitierte sich 1999 an der ETH. Er unterrichtete u.a. an der Universität Genf, der Universität der Künste Berlin, der Columbia University New York, dem Barcelona Institute of Architecture und der Universität Zürich. Sein jüngstes Buch ist *Der Wert der Oberfläche: Essays zu Architektur, Kunst und Ökonomie* (2017). 2017 erhielt er vom Bundesamt für Kultur den Meret Oppenheim Preis.

In prehistoric times, the most common way of making pottery was coiling. Potters rolled a lump of clay into a coil. They then gradually built up the vessel by adding more coils. They would pinch the coiled layers to the one beneath and thin them by squeezing the clay between the fingers. In the end, they smoothed the junctures between the coils. Five thousand years later, children in pre-schools around the world are still taught the same method. They learn how they can transform raw matter into a useful and beautiful object. Teachers encourage this practice, because they know that the pinching, pressing and smoothing of matter with one's fingers are directly linked to the development of language skills. The tactile is closely related to speech. The word ‹syntax›, namely the rule of arranging words in a sentence or formulating a computer-language, stems from the Ancient Greek «to put together», to «arrange». Shaping an object and shaping a sentence are intrinsically related to each other. Furthermore, the production of pots is related to architecture. Gottfried Semper, in his attempt to articulate a coherent theoretical system of architecture, conceived ceramics as the very basis of architecture. In his book ‹*Style in the Technical and Tectonic Arts*›, first published in German in 1860, he conceives clay as the common base and primary material of all arts. He illustrates this idea with a drawing made after an antique wall painting, depicting the Greek philosopher Diogenes who is said to have been living in a large ceramic jar. [A]

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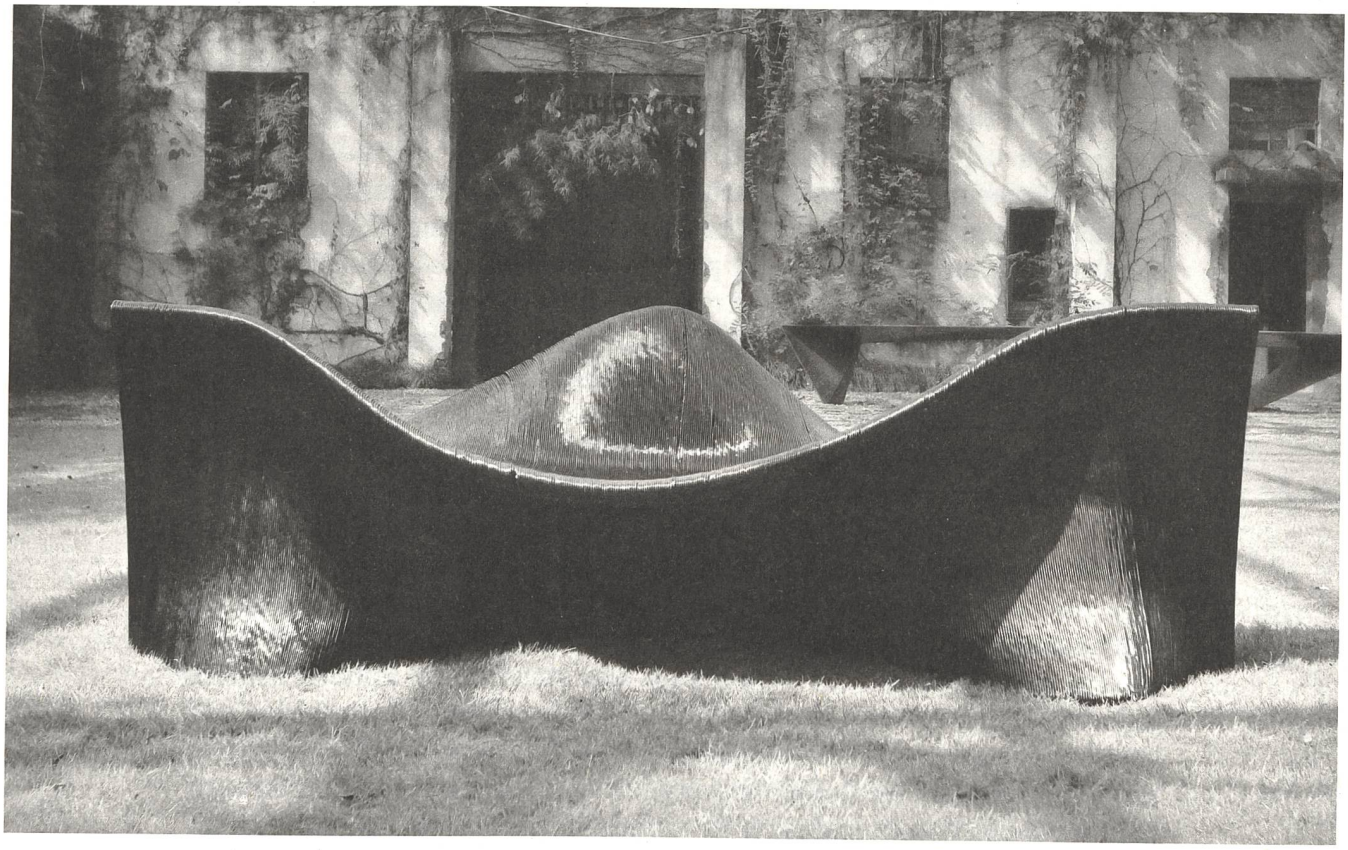
All this comes to my mind when I first put my hand on a 3D Printing chair by Archi-Union in their studio in Shanghai. Philip Yuan is giving me a tour through the studio spaces, the workshops, and the large adjacent hall, where two wind tunnels are installed and finished and planned projects are displayed. I am amazed by the beauty of the studio which is a transformed silk factory, a project of its own that connects the present with the past, recycling many of the older structures. I am also excited about the diversity of projects, the elegance of the models and photographs. But when he announces that he will show me the latest results in 3D printed furniture, my expectations are not too high. Generally speaking, I find the outcome of milling, laser cutting, and printing machines in the realm of design predictable. Those who program the machines seem compelled to mimic algorithms and complex geometries in order to represent ‹the future›, ‹the contemporary›, or ‹the digital›. There is a stark contrast between the virtuosity of the machines and the stereotypes that result from these processes. However, the object that I see in the hall strikes me as something different. I touch it with my fingers and my hand, knock on the surface with my knuckles, shuffle it around. It is surprisingly heavy and robust. The surface of the synthetic material feels a little sticky, something between resin and rubber, rigid, yet pleasant to touch. The innumerous individual thin coils of the printing process are clearly visible and tangible. The joints are not fully smoothed and the surface is not completely homegenized. When I take a seat, the chair feels comfortable and stable. [B]

Fass des Diogenes.

A
The Jar of Diogenes



B
Archi-Union, 3D Printing Chair, 2018

The association of prehistoric ceramics and early childhood bricolage with the 3D Printing Chair in Archi-Union's Shanghai [1] studio might seem somewhat far-fetched. Isn't this the result of the most sophisticated machinery, the most advanced materials and the most up-to-date shapes that can be found? Perhaps my reference is triggered by the black and white color of the chair's material which reminds me vaguely of the ash-like surface of early ceramics that have come out of the fire. After all, 3D printers also produce heat, melting the plastic which then hardens. In fact, there is something deeply archaic and raw emanating from this object. Whereas in general 3D printers emit thin plastic threads which expand into space like spider webs or the pixelled sand-surfaces that literally look abstracted and dematerialized, the object I am confronted with stands firmly on the ground. The slightly irregular fabrication process—the printer adding thin plastic coils to each other that are never totally identical—remains visible like the traces of human fingerprints on some age-old pottery. After all, the word ‹digital› stems from the Latin word ‹digitus› («finger») and its meaning, besides «being related to numbers» is also «performed with a finger».

What is this chair? Is it a sculpture or a piece of furniture, an architectural model, or even an architectural fragment in the scale one to one? Is it a prototype for mass fabrication? An experiment? Or a manifesto? It is a challenge to these categories, and this already is a sign of its significance within the architectural oeuvre of the office. In this chair, the structural elements and the surface cannot be separated. A tension runs through the entire object, the tectonic and the envelope are blurred into one single materiality. The fabrication process remains visible. The chromatic gradation and the gently curved surfaces are elegant and beautiful. The abstract and the concrete merge into one.

What I learned in Archi-Union's studio is how 3D printing produces a material presence, and atmosphere of its own. The 3D Printing Chair, of course, is not architecture. And the larger printed works that I saw, the 3D Printing Bridge, the 3D Printing Wall, and the 3D Printing Pavilion—a version of it is shown at the Venice Biennial 2018—are still less convincing as artifacts. I do not know how the first cases of printed architecture will look like. But I am confident that there these spaces will exist and become part of our daily environment, that they will age well and be as real as anything else.

How does my experience in Shanghai relate to our Department of Architecture? To some extent, my visit in the studio felt like a trip to the near future. Not because of the new equipment. The same robots and printers that are used in Archi-Union's fabrication halls also stand in the Robotic Fabrication Laboratory of Arch_Tech_Lab. But what is different in Archi-Union's studio is that the fabrication tools are located just next to a library and an art collection. The architects working in the studio are browsing through books and catalogues, sitting in 3D printed furniture with paintings from

the 1980s and 1990s behind their backs. They mix traditional media and advanced tools, using the newest technology as if it had always been available. The resulting 3D Printing Chair is emblematic of an attitude that considers both the past and the future.

In the Department of Architecture, we tend to keep the various elements of architecture separate. The slogan of ETH Zurich is «Where the Future Begins». A linear perception of time, largely inspired by the ideology of progress that marked the period from the 1870s to the 1960s is still at stake. Our Department largely echoes this ideology. Technology is researched at the Institute of Technology in Architecture, history is studied at the Institute for the History of Art and Architecture, whereas design is taught at the Institute of Design and Architecture. A narrow bridge leads from HIL to Arch_Tec_Lab as if it were two fortresses, separated by a trench. Some colleagues such as Philippe Block, Joseph Schwartz, or Benjamin Dillenburger who are specialized in robotics, 3D printing, and structural engineering, are entering the realm of studio teaching. And some colleagues from the realm of design are approaching the field of sustainable construction, such as Miroslav Sik's studio where solar panels are integrated. I have no doubt that our students will soon be able to move a robot or a 3D printer with the same dexterity they show with a pencil, a paint brush, a piece of wood, or a computer mouse. I am also quite sure that they, if they wish to, will have the possibility to do their diploma with a professor from the Institute of Technology and Architecture. But the biggest challenge will be to absorb these techniques into the design process, to give technology an architectural face, to consider it with a historical horizon in mind, rather than mimicking clichés of digitalization.

Some observers predict that the profession of the architect will soon be replaced by artificial intelligence, like the professions of the lawyer, the accountant and the tax preparer. I am not so worried, but confident that architects will be needed in future. If design—to paraphrase the sociologist Niklas Luhmann—is about ‹*increasing*› complexity, while engineering is about ‹*reducing*› complexity, then the practice of design is likely to remain in the minds and hands of architects. If real estate—the price of the land and the price of equipment for constructing, maintaining and dismantling buildings —remains the driving force of the building industry, then the comparatively low costs for labor in design and manufacturing are no incentive for capital to invest in rationalization processes. Design, in other words the projection into the unknown, the visualization of something for which there is neither a formula nor words, is not the same as problem solving. Rather than solving problems, architecture is about articulating problems.

The boom of the construction industry in the last three decades has led us, particularly in our own school, to consider the built results as reality, as opposed to the unbuilt, which is ousted as utopian. This resonates in binary distinctions between the real and the virtual and, in consequence, between

the concrete and the digital, echoing much older distinctions between idea and thing. We should recall that in the 1970s and 1980s, the unbuilt was more relevant—more real, one might argue—than the built. Most of the imaginative energy was directed towards discussing plans, possibilities and utopias rather than serving others. The drawings and paintings by Zaha Hadid that circulated in the mid-1980s told us more about the space of computation and digital techniques than many later realized buildings, including some of her own. And the charcoal drawings by Jacques Herzog from the same time period changed our view of architecture as profoundly as many of the later realized buildings. The presence of digital fabrication and technologies bear a huge potential not only for the process of constructing something that has been designed, but also for the way design, as such, is imagined. Particularly in the framework of our own architecture school, in other words within a concentration, not a simulation, of practice, there is room for the utopian. It is easy to access, if only we decide to do so.