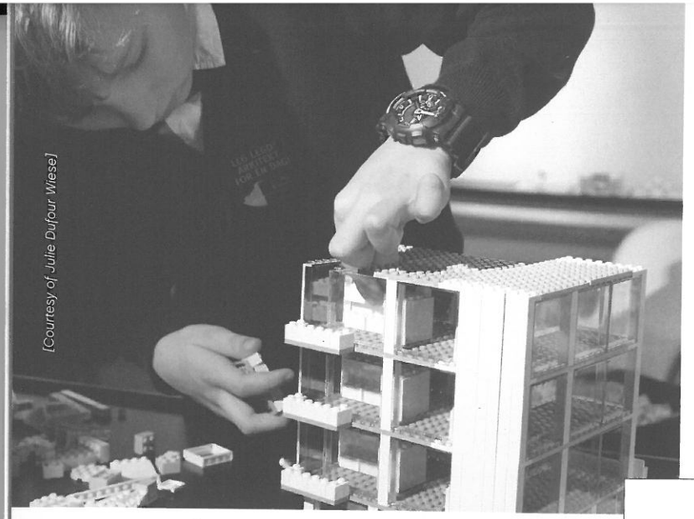
Welcome

by Paal Smith-Meyer, Senior Creative Director, the LEGO Group

From the time the very first two LEGO® bricks were put together over 60 years ago, kids all over the world have been building houses, fire stations, and imaginary buildings with wings and wheels. One brick at a time, each brick inspires you to continue building, inviting you to find the next brick that will shape what you otherwise only imagined, and it goes on and on until you say, "This is it!"

[A young Keld Kirk Kristiansen building]

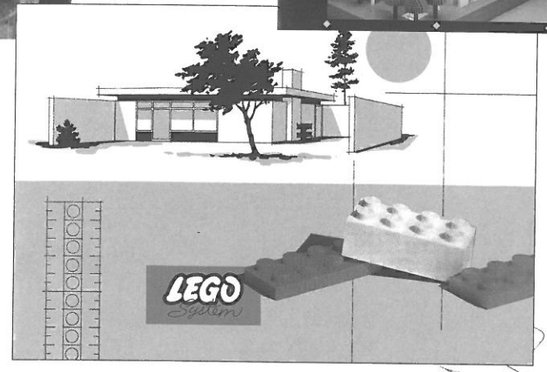


[Courtesy of Julie Dufour Wiese]

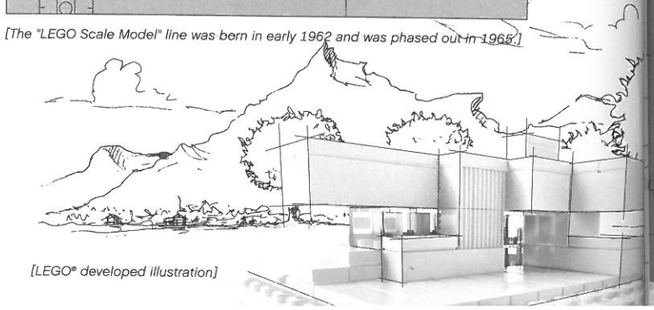
Have you ever wondered how the buildings that surround us were created, why they were built, where the ideas regarding their function or aesthetics came from, or questioned the journey that led a group of people to make the decisions that resulted in a building becoming what it is? Design is not a coincidence or a formula; it is a result of human reflection and vision in response to a specific challenge.

Together with six architectural practices from around the world, we invite you on a journey into the world of architecture, the world surrounding us, our homes, our schools, offices, and public buildings. Everywhere we look, architecture has made its mark and will continue to shape the world around us in the future. You will see the steps of the design process and learn about the thoughts that go into a final building design. You will come to understand that there is not just one way to design a building: there is a red thread that goes through all of the architects' work, from the first brief to a final presentation.

[A building event/exhibition in 1985 where 30 young European architects were given the opportunity to play with LEGO® bricks. Hosted by the Pompidou Centre in Paris]



[The "LEGO Scale Model" line was born in early 1962 and was phased out in 1965.]



[LEGO® developed illustration]

The LEGO brick is the perfect tool for exploring the ideas of architecture, using your hands and your imagination together. So this is more than a book: it is an invitation to a hands-on experience that will allow you to explore the ideas and principles of architecture with the LEGO brick. Get a feeling for the built environment by building it yourself—and then share your ideas with the world.

Maybe one day an aspiring young architect will look at your building and think, "I wonder why it was designed to work like this?" or "Why did the builder choose these materials?"

We hope that through this book you will be inspired and enlightened and that you will share your experience with us, so we can make it even better.

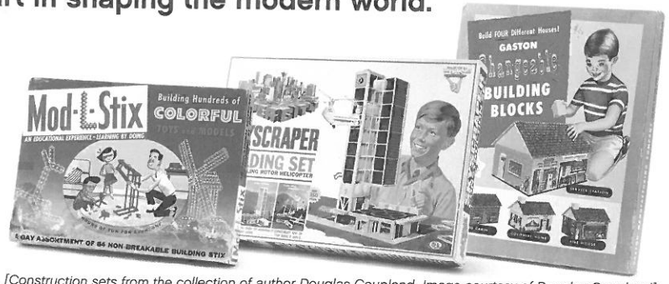
Architecture and Creative Play

by Christopher Turner

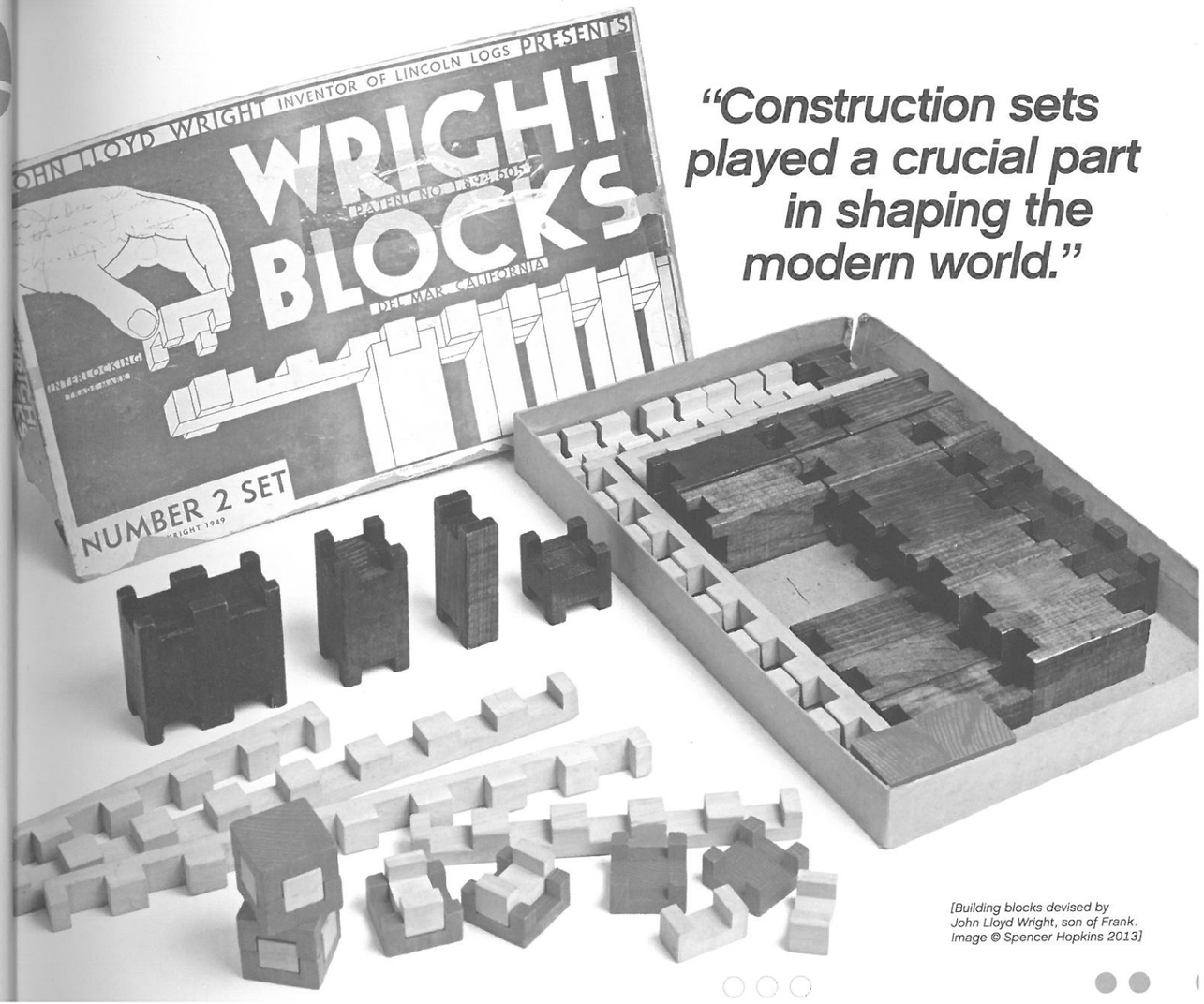
Frank Gehry—the Pritzker prize—winning architect behind the Guggenheim Museum in Bilbao, Disney Hall in Los Angeles, and the Manhattan skyscraper, 8 Spruce Street—laments the loss of "creative play" in the architecture profession. As a child, growing up in Toronto, Canada, Gehry was encouraged by his grandmother to build miniature cities and imaginary houses out of off-cuts of wood salvaged from his grandfather's hardware store. It was the happy memories of these play sessions that inspired him to take architecture classes. Gehry defines "creative play" as "letting one's intuition express itself, but in a knowledgeable, not haphazard way" and this playful spirit is an integral part of his working practice, which involves modeling with coloured wooden building blocks, not unlike outsized LEGO® bricks, that allow him to experiment with space, scale, and volume.

Plato advised that future architects should play at building houses as children, and, indeed, most architects learned the laws of gravity, physics, engineering, and omnipotence playing with construction kits. LEGO bricks and Erector and Meccano sets allow children—and adults—to create an infinite range of structures that explore form and test the limits of stability. Construction sets, which have a long history, were originally conceived in the eighteenth century as "philosophical toys": they were intended not only to amuse but to serve an important educational purpose. In so doing, they played a crucial part in shaping the modern world.

[Construction set from LEGO®. Image LEGO®]



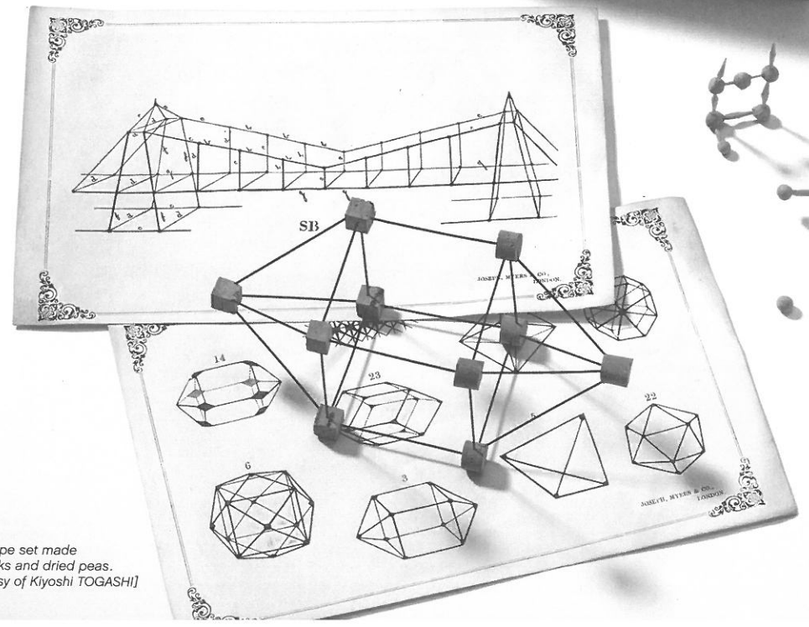
[Construction sets from the collection of author Douglas Coupland. Image courtesy of Douglas Coupland]

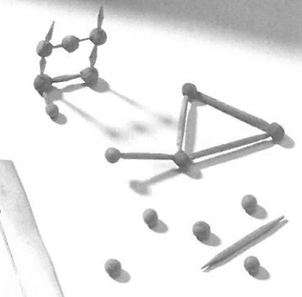


"Construction sets played a crucial part in shaping the modern world."

[Building blocks devised by John Lloyd Wright, son of Frank. Image © Spencer Hopkins 2013]

"These toys were the building blocks of modernism."

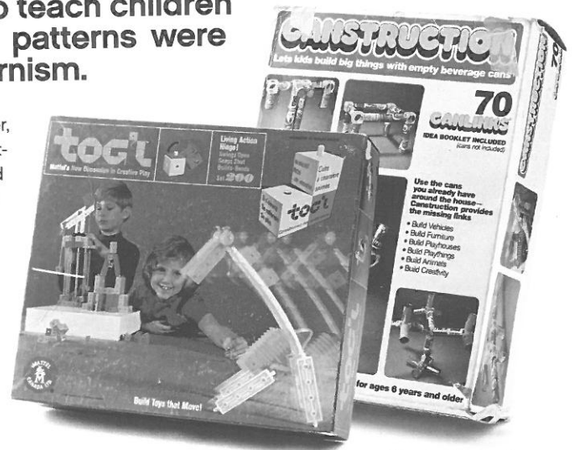




[A Meccanotype set made from toothpicks and dried peas. Image courtesy of Kiyoshi TOGASHI]

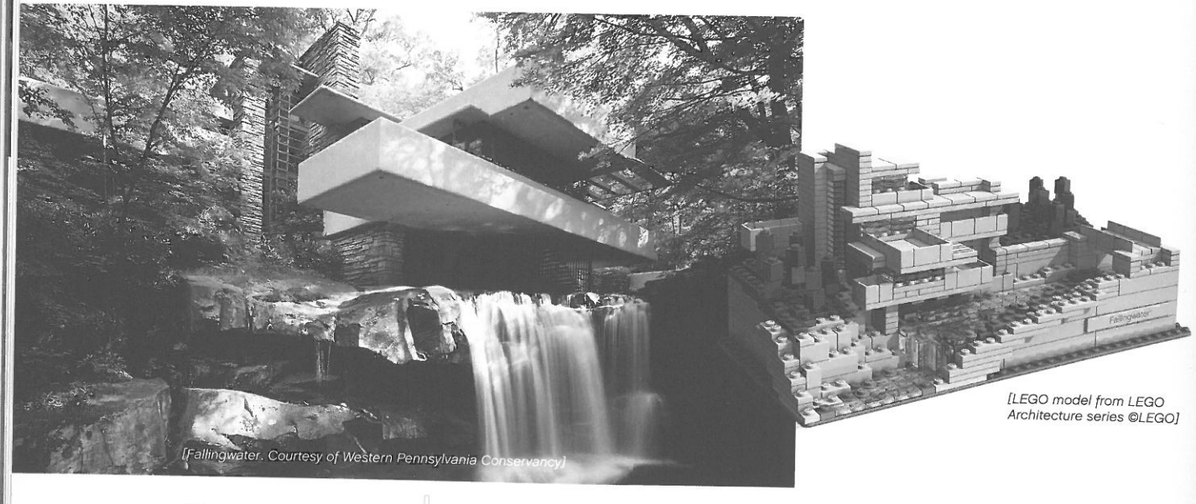
It is no coincidence that Frank Lloyd Wright, Le Corbusier, and Buckminster Fuller were all taught in kindergarten the school system that introduced building blocks into educational play. These simple forms reveal the first traces of modernism—the start of a relationship between architecture and creative children's games that continues to this day. In *Inventing Kindergarten* (1997), the New York sculptor and architect Norman Brosterman argues that the pedagogical tools used in the second half of the nineteenth century might be interpreted as having laid the ground for geometric abstraction in art and architecture. Brosterman convincingly shows that the 20 "play gifts," or architectural toys, used by the German educator Friedrich Froebel to teach children an appreciation of abstract patterns were the building blocks of modernism.

Frank Lloyd Wright, Le Corbusier, Buckminster Fuller, and many other members of the architectural avant-garde went to kindergarten schools and played with Froebel's geometric toys. They sat at special gridded desks where they experimented with knitted balls, building blocks, colored sticks, rings, mosaic tiles, and a rudimentary construction set made from toothpicks with dried peas for the joins. Froebel drew plans for educational tools that implicitly foreshadowed the actual buildings that Wright, Mies van der Rohe, Adolf Loos, and Le Corbusier would design when they grew up.



[Construction sets from the collection of author Douglas Coupland. Image courtesy of Douglas Coupland]

In his autobiography, Wright, who went to a kindergarten school outside Boston, and whose mother trained as a kindergarten teacher, acknowledged the profound influence this education had on him. He was taught not to copy nature but to appreciate the basic forms hidden behind appearances. "For several years I sat at the little kindergarten table," Wright wrote. "The smooth cardboard triangles and maple-wood blocks were most important. All are in my fingers to this day. . . . I soon became susceptible to constructive pattern evolving in everything I saw. I learned to 'see' this way and when I did, I did not care to draw casual incidentals to Nature. I wanted to design." Wright wrote that these toys directly informed the organic abstractions and clean geometric lines found in his buildings and the regulating grids of their plans.



[Fallingwater. Courtesy of Western Pennsylvania Conservancy]

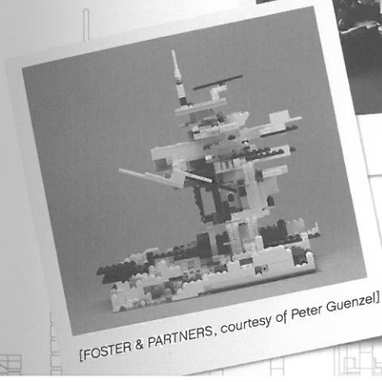
[LEGO model from LEGO Architecture series ©LEGO]

It is no surprise that these structures, with their careful balance of interpenetrating forms, lend themselves to being reimagined as architectural toys: you can now buy a kit that enables you to build his famous Fallingwater in LEGO pieces. *ICON*, the architecture magazine that I edit, asked several leading practices to take this set, or others from LEGO's architecture series, and rebuild them in their own fashion: Foster and Partners fused Fallingwater with the Empire State Building to create a sustainable tower with a series of hanging gardens; FAT laid the pieces from the Wright model out as a city grid; ATMOS melted it in the oven in response to Wright's suggestion that architecture would "bring out the nature of materials." They showed that the fun of LEGO was that, deviating from the plan, you could make anything you liked—exactly the premise of the new Architecture Studio Set.

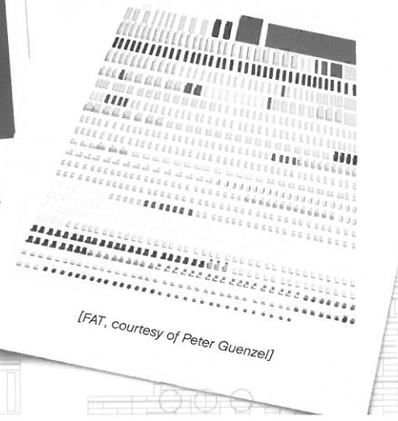
It is this spirit of playful curiosity and childish excitement that carries over into the most innovative buildings, which we celebrate here in this book. While some of the architects included in this volume, such as Moshe Safdie (with Habitat 67) and Winy Mass (in MVDRV's Oslo bank HQ), have experimented with LEGO models in their practices, most use other tools. But they all acknowledge the importance of what Gehry called "creative play" in the process of design, and celebrate LEGO, with its inherent abstraction and modularity, as a creative tool. In fact, many of the buildings by architects featured here—REX's Museum Plaza and Tham & Videgård's Humlegården Apartment—have been compared to LEGO, and the Dutch architect Herman Hertzberger has likened the current trend for pixelated towers, particularly in Asia, to structures made of LEGO bricks.

The childhood experiments with LEGO undertaken by the architects of these buildings, it seems, continue to leave their mark. LEGO is a way of thinking, as well as being good to think with, especially in the early stages of design. Santiago Calatrava, for example, who had a voluminous toy box as a child, still plays with architectural toys as he looks for inspiration for his bridges and skyscrapers. "My approach to design begins with the creation of toys and games," Calatrava has said, "that can give plastic expression to the principles of statics."

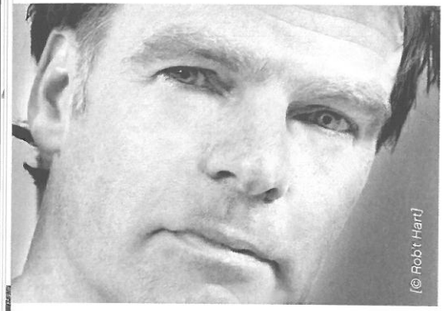
[ATMOS STUDIO, courtesy of Peter Guenzel]



[FOSTER & PARTNERS, courtesy of Peter Guenzel]



[FAT, courtesy of Peter Guenzel]


(© Robb Hart)

Interview by Christopher Turner

Dutch architect and city planner Winy Maas, who once worked for Rem Koolhaas, is one of the founding members of the Rotterdam architectural consortium MVRDV, established in 1993.

In 2012 MVRDV's research arm, The Why Factory, in collaboration with Master's-degree students at the Delft Institute of Technology and architectural studio KRADS, created a model of Europe with hundreds of LEGO® pieces. Porous City, an exhibition of 676 LEGO towers at a scale of 1:500, was exhibited at the 13th International Architecture Exhibition in Venice, which had the theme "Common Ground."

When did you have the idea for the grand, experimental project with LEGO that you exhibited at the 13th Venice Biennale?

The idea came about in 2011 when I visited Reykjavik and met KRADS, a young architecture group based in Denmark and Iceland, some of whom had been working in our Rotterdam office. After the lecture I gave there, they led a workshop that used LEGO to explore form finding: at that moment I think the Pixel Towers project was born. We would use LEGO to create an exhibition showing a series of studies based on the brick's modules. So we developed it immediately.

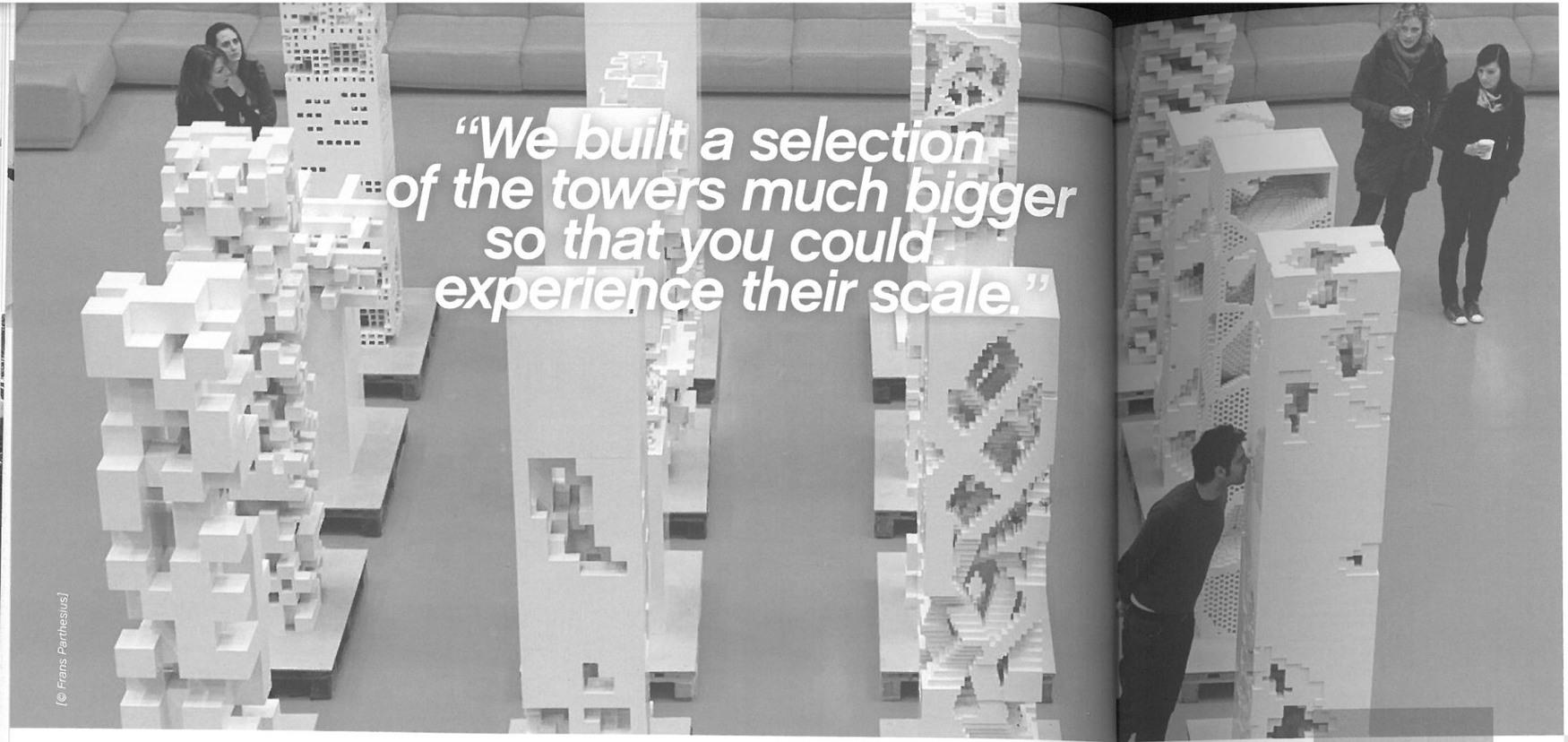
What was the brief you sent your students at the Faculty of Architecture of the Delft University of Technology when you began the tower series?

We started with a dichotomy—void and mass—and what followed was a series of studies exploring that. We began with a porous tower; we wanted to imagine how towers could be more open or more European, as we called it. We analyzed the traditional American tower, which seemed to be only about commercialism, and looked at other towers on the other side of the planet, in mainland China or India, where housing typologies were leading to simple extrusions, with the same floor plan everywhere.

The LEGO® Brick in Architecture Studies:

The Pixel Tower projects with The Why Factory and Winy Maas

(© Frans Parthesius)



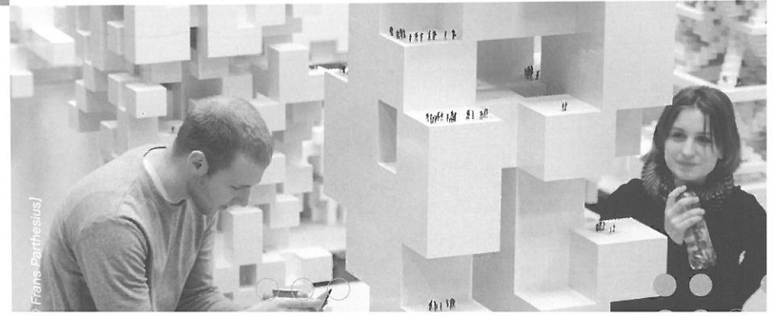
So, we could imagine that opening the towers up would be more ecological and social and would enrich the tower typologies. Maybe this would lead to a situation where towers might become more urbanistic and be used for more things, not only as an answer to density. In our first exercise, we started by simply asking students to make the towers more ecological or more social, and they came up with stairs, with landscapes, with grottoes that perform as improvements in the quality of collective spaces. They came up with a variety of sequences. It's a very beautiful series, I think.

At the Venice Biennale you exhibited these as a gridded city of 676 miniature towers. What did you hope to learn from these iterations?

I noticed that MVRDV had been engaged in revisiting the tower typology for a long time. In the Mirador, a 22-story tower in Madrid, for example, we opened up the tower by having a big central void in the middle of it, transforming it into a large, open-air balcony with fantastic views. Or in the Celosia tower after it, also in Madrid, a city block divided into 30 apartment buildings arranged in a checkerboard pattern, we made gardens on every floor, opening up every apartment to the wind and light. We see a lot more hollow towers now, like Rem Koolhaas's CCTV in Beijing, and towers by the likes of Peter Eisenman. This seemed worthy of attention—it seemed like a subject or topic to explore.

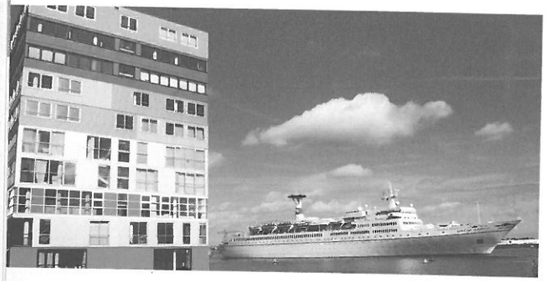
At BODW (Business of Design Week) in Hong Kong you exhibited nine larger towers. What issues did you hope these might address?

We built a selection of the towers much bigger so that you could experience their scale. We added detail in these big towers and, not unimportantly, post-scripted them, to show the relationship between, say, the degree of porosity and the size of the tower, so that we could balance out these parameters. We hope to do further investigations on the relationships between porosity and the percentage of openness, and the sculptural, aesthetical, and functional effects this has.



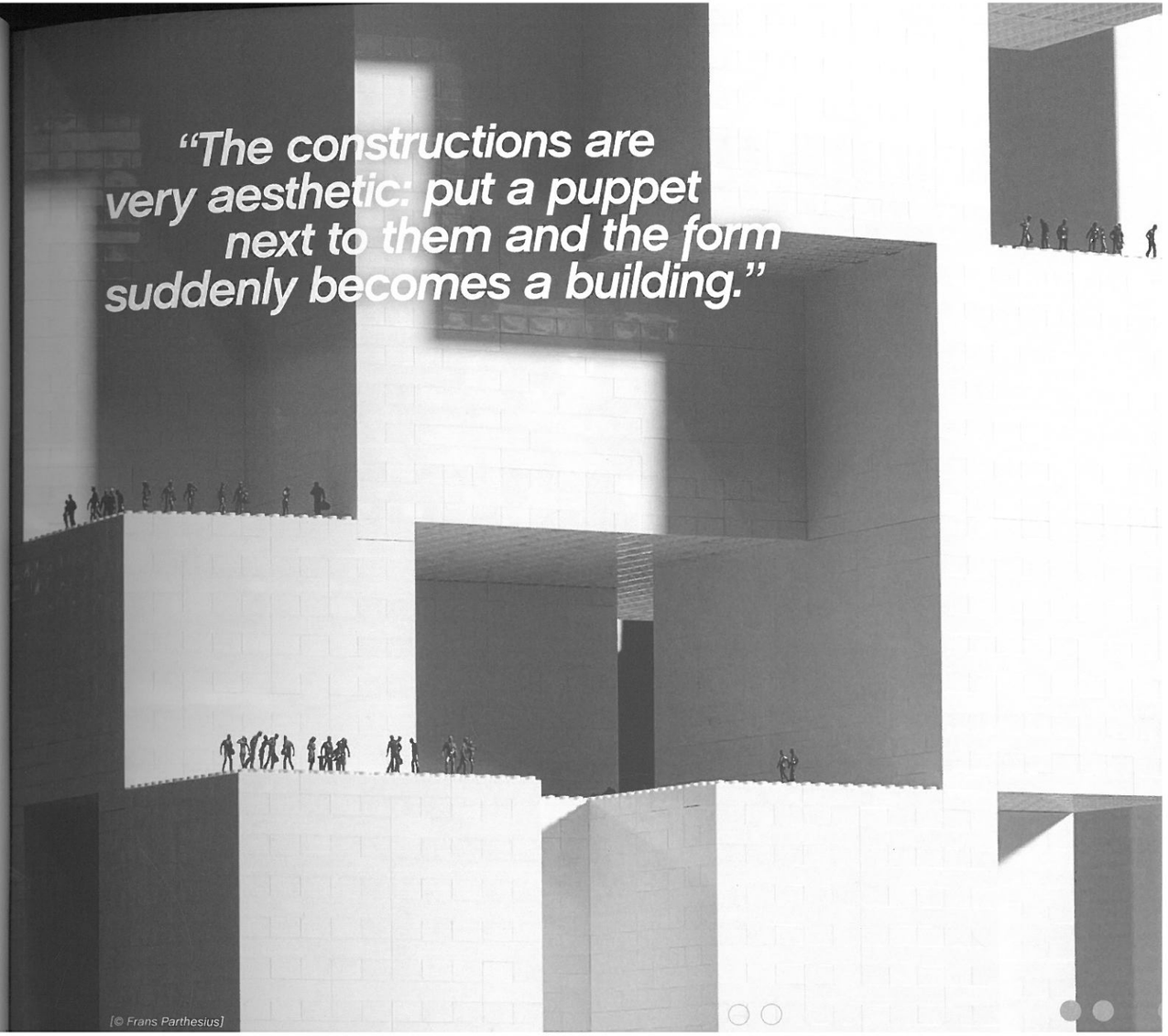
Why is LEGO good as a design or sketching tool? Why is LEGO good to think with?
I know there are limitations, but in this case the pixelization inherent in LEGO helped—it was the proper material to explore these ideas with. And second, it's fast; if it's not working, you can kill it and rebuild it relatively fast. Third, people know the material because everyone has grown up with it; they like the towers because they are playful, they have an element of joy in them that makes even the most serious research more bearable—so the psychology behind it is very useful. This is perhaps why our research has spread over the Internet so much, which indicates the love people have of this kind of enterprise. Last, but not least, the constructions are very aesthetic: put a puppet next to them and the form suddenly becomes a building. LEGO allows you to fantasize: you see a building in it but it is not completely determined. There is a high degree of abstraction to it. My students love working with LEGO because you can build models very rapidly and do tests and it's relatively cheap when you compare it to 3D modeling, which is still very expensive.

Your project at Silodam, an apartment block in Amsterdam's dock area, was compared by the* New York Times *to "a child's giant LEGO construction." Do you use LEGO models in your MVRDV's creative process?
We did use LEGO in the office when we worked on the DnB NOR building in Oslo, a 17-story bank headquarters on the Bjørvika waterfront that had this pixelization requirement that LEGO helped us to create. That project will be open early next year. But before then, no. I'd have to go back to my childhood. How could you avoid using LEGO as a child? In fact, initially my parents had another kind of building system, Bambino, the Italian toy, but my cousins had LEGO and I played with LEGO when I visited them there. This left its mark.



[Silodam in Amsterdam, courtesy of Ina Knopfe]

[Silodam in Amsterdam, courtesy of Rob't Hart]



[© Frans Parthesius]

INTRODUCING

Builds and Creative Sessions

Throughout the book, we will demonstrate how you can explore the parameters and design process in architecture with the LEGO® brick, through hands-on exercises.

Every project starts with an architectural brief. The brief becomes the guide for the entire project and can evolve during the initial stages. A god brief can be very detailed, defining the program and material, or it can be very open, where architect helps to shape project requriements.

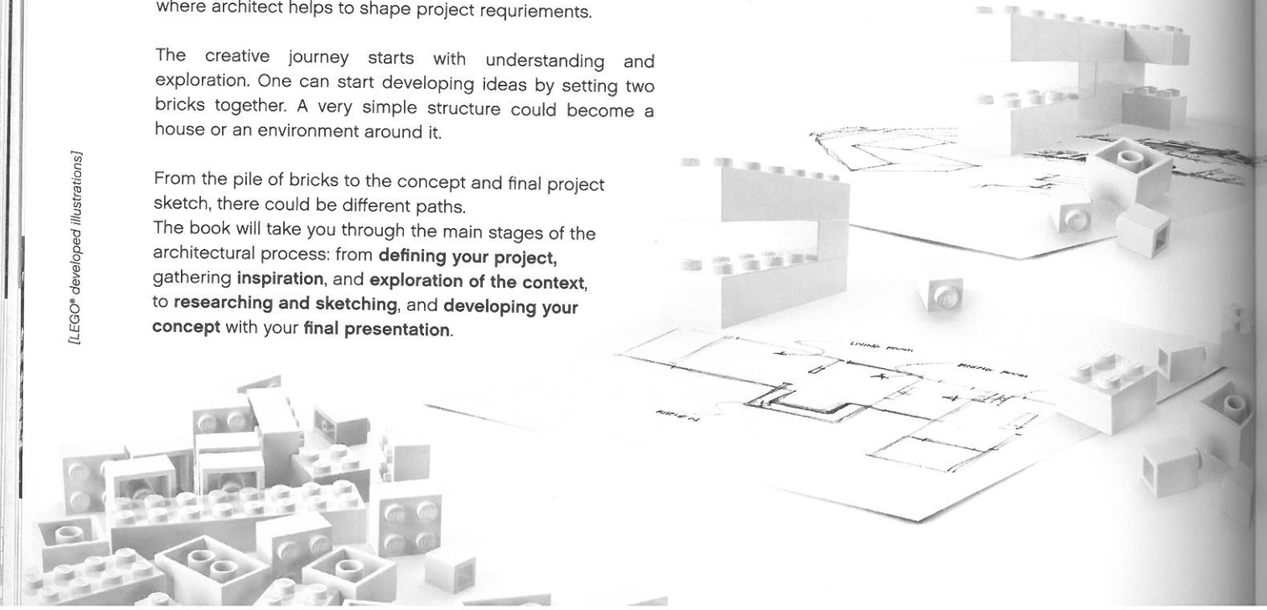
The creative journey starts with understanding and exploration. One can start developing ideas by setting two bricks together. A very simple structure could become a house or an environment around it.

From the pile of bricks to the concept and final project sketch, there could be different paths.
The book will take you through the main stages of the architectural process: from **defining your project,** gathering **inspiration**, and **exploration of the context**, to **researching and sketching**, and **developing your concept** with your **final presentation**.

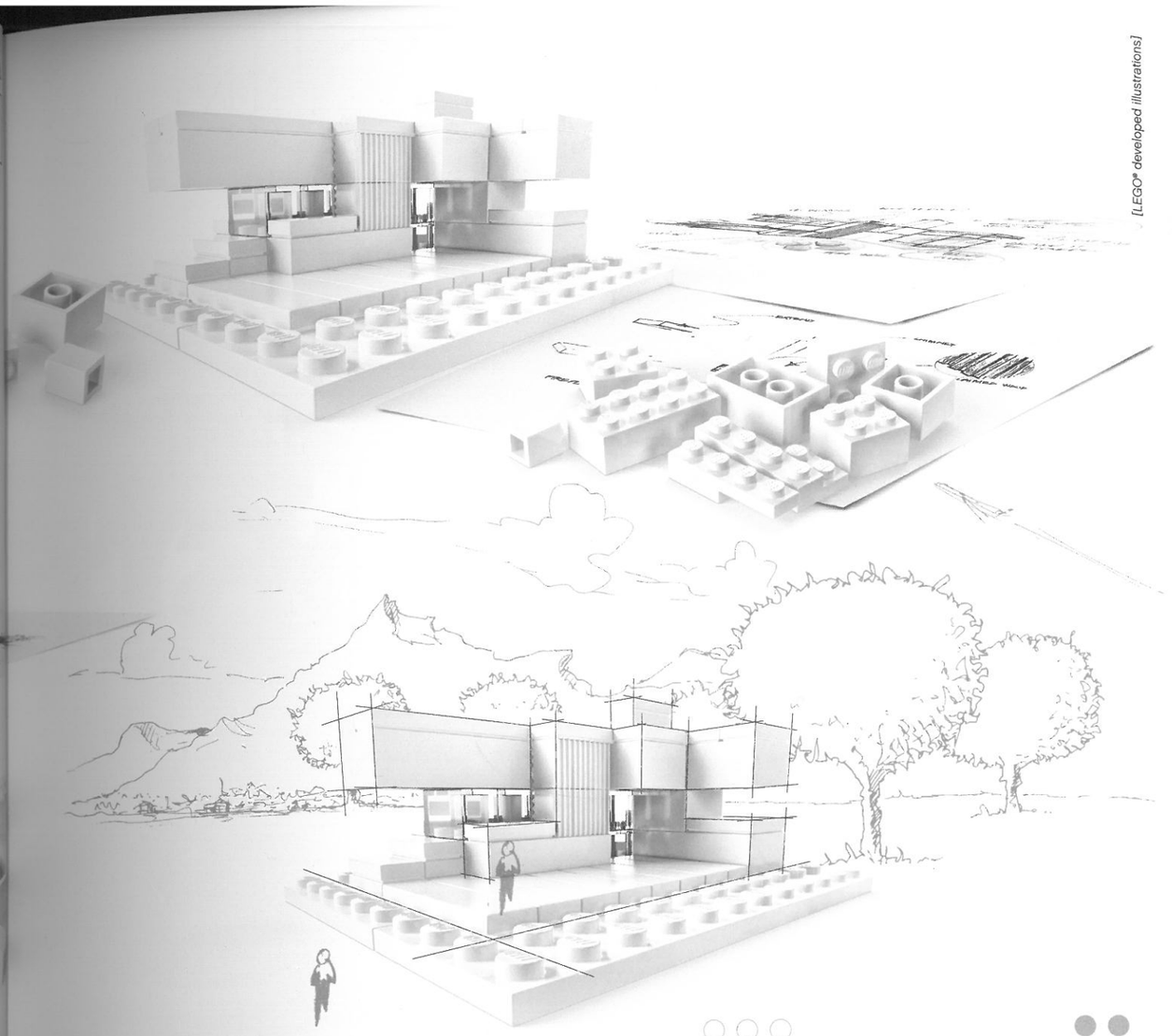
The idea presented here shows how just a few bricks can become a family house concept.

You will find additional examples created by architects and LEGO designers that will explain some of the important design parameters.

Create your own architecture.



[LEGO® developed illustrations]



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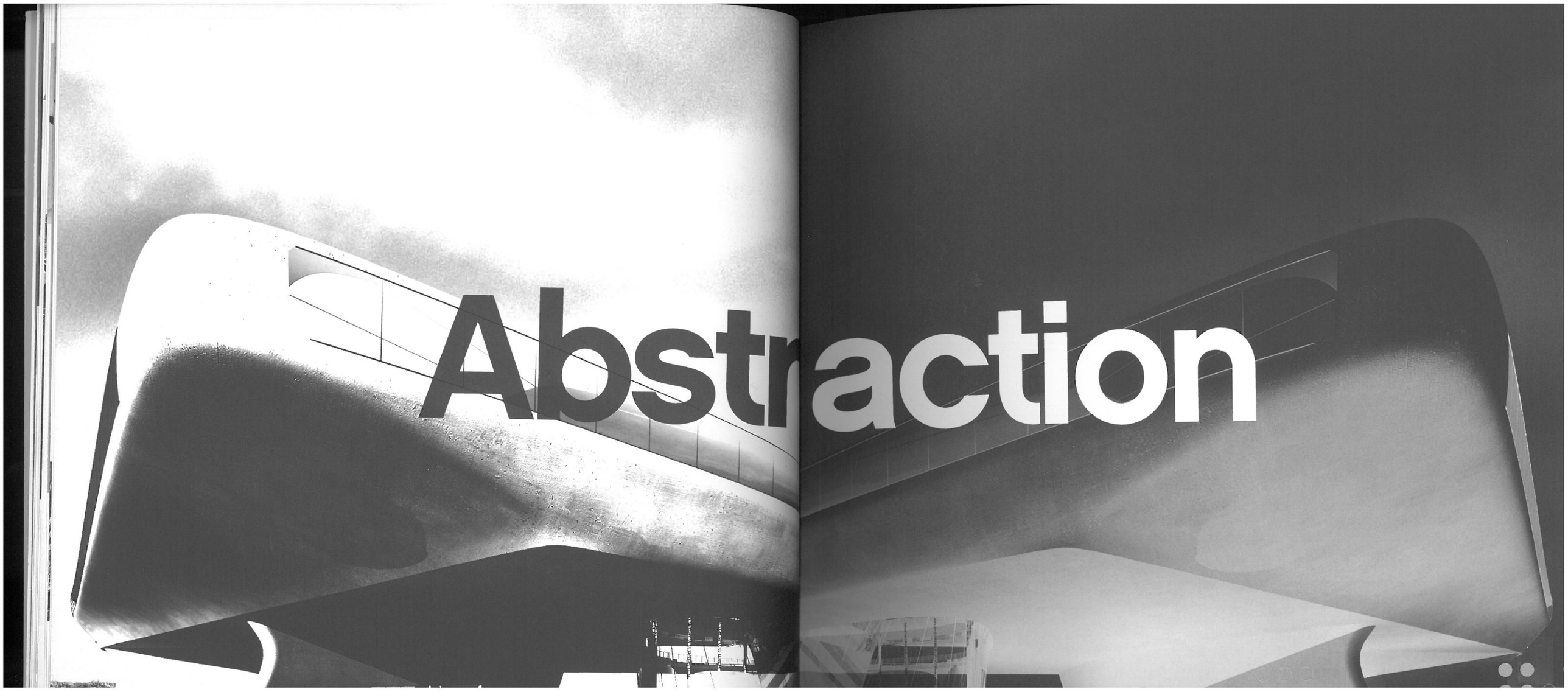

Abstraction

Hands-On Exploration

Abstraction

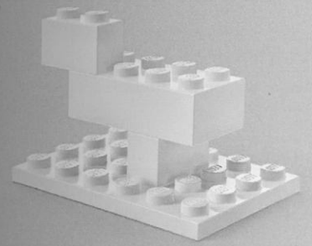
How can we use various sources as inspiration in the design process?

A simple, and basic method of dealing with inspiration is doing the abstraction. Choose an image you find inspiring, like an object, a site, or maybe even a topic or a feeling you have. **To abstract means to "draw away."**

Take important features from your source of inspiration and try to express them in LEGO® sketch-models. What are the elements that inspire you?

If you look at the mountain, you might find the silhouette of a mountain inspiring. Then start building the LEGO sketch-model by representing the silhouette in LEGO bricks—thus making your abstraction of a mountain landscape.

[LEGO® developed illustrations]



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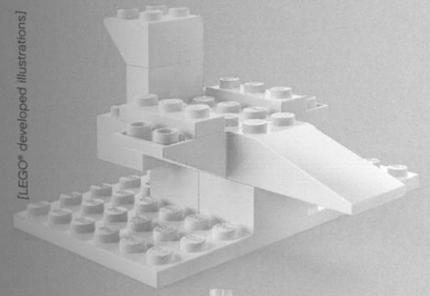

[LEGO® developed illustrations]

Let's start the exercise:

The first step is to choose the inspirational source. In our example we look at a bird. . . .

1

Make a number of simple sketch-models with the LEGO bricks that express your inspiration.

2

Select one of the sketch-models and add more details to it. Or choose to combine two small sketch-models together.

3

Now, think of an architectural object—and rebuild your sketch-model. Is it a building, a design object, part of the city?

4

Imagine how your sketch-model turns into an architectural project. Imagine its function, the site, or other specific features.

[LEGO® developed illustration]