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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 good brief can be very detailed, defining the program and material, or it can be very open, where the architect helps to shape project requirements.

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.

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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.

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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?

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

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Hands-on Exploration: LEGO® builds
Scale

1:1 is the **default scale** of the LEGO® brick. While only looking at a pile of bricks, the question of scale is merely a question of relations between bricks, the size of different combinations of bricks, and detailing of the build models: one model is taller than the other.

One brick could be a city block and the studs could be small buildings, or a combination of bricks could be a house. The scale of the brick is in the eye of the beholder. At the moment you start to relate the brick to the surroundings or an imaginary world, you define the scale of the objects. **It is all a matter of scale and detail.**

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Relating to the real project, like the Yongsan International Business District "Project R6" in Seoul, Korea. The LEGO brick can represent a large volume (several stories of the building), or just a fraction of one level. Choosing a bigger scale with more detail makes it possible to show important elements of the building, like individual stories and the correct number of windows in them.

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The exercise for you to explore Scale:

1. Make a sketch-model that has objects of different sizes in it. The scale of your sketch-model is perceived relative to the sizes of other things around it.

2. When adding more details and recognizable elements to the same sketch-model, it becomes more of an architectural object, clearly illustrating the scale.

   By adding a car, a person, or another point of reference, the model could become a building, and the small LEGO brick on the right could become a bench; or the model could become a high-rise (like sketch 3 on the right side), while the small brick becomes a one-story building.

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3. Imagine the function of the building and context of the site. By adding some visual elements, we can make it appear as large as possible.

   Try to add context to your sketch-models that will make them appear to be in different scales.

   See additional examples of Scale and Modules in the chapter "Defining Your Project" on page 111.

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Scale
Hands-On Exploration with REX Architects

We asked the team at "REX" to give their interpretation of **"scale"** using the LEGO bricks. It was a three-step exercise.

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1. Make a number of LEGO sketches that express **scale.**

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2. Pass your model to another person and have them further build on the concept.

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3. Develop your model, thinking of an architectural expression. What do you imagine?

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Hands-On Exploration: LEGO builds
Space and Section

Section is an investigative tool to explore **space.**
By cutting through a building or landscape you can reveal space and also relations between spaces inside the building.

Empty space encompassed by architectural mass is also called a void. In this instance, the voids are the rooms in the house.

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Architects very often start designing “in negative”: it is about designing a space where people live or work.

You can design spaces and how they relate to one another by perceiving the LEGO® bricks as empty space, in our case, the interior spaces of a house. We created a big single space on the ground floor and two smaller ones in the floor above.

If we were to open the house, we would see the interior spaces inside it. The LEGO bricks in the middle represent the empty space inside the house: the rooms and other interior spaces. The roof terrace represents another form of space; even though it is outside, it still belongs to the house.

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The exercise for you to explore Space and Section:

Make some sketch-models with the LEGO bricks that represent different spaces in the structure.

Try to imagine how the different spaces make you feel. What elements of the space and structure evoke this feeling?

The cube structure on the right occupies the space but it can also contain a volume of space inside. You can explore different ways of defining space.

A volume of space doesn’t have to be enclosed to be defined; four columns placed in the corners outline the cube.

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Openings such as doors and windows in the building establish relationships between inside and outside spaces.

A tall, narrow, brightly lit space appears significant and imposing.

A tall space will feel even taller if you imagine that the building has a low entrance.

Space can evoke a multitude of feelings. Can you make a space that feels vibrant or mysterious, peaceful, safe, or maybe playful?

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Space and Section
Exploration within projects of Sou Fujimoto

Sou Fujimoto House N
Location: Oita, Japan
Design Year: 2006-2007
Construction Year: 2007-2008

A home for two, plus a dog

The house itself consists of three shells nested inside one another. The outermost shell covers the entire premises, creating a covered, semi-indoor garden. The second shell encloses a limited space inside the covered outdoor space. The third shell creates a smaller interior space. Residents build their life inside this gradation of domain.

This is a presentation of an ultimate house in which everything from the origins of the world to a specific house is conceived together under a single method.

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Sou Fujimoto
House N
This image shows the longitudinal section made by cutting through the longest axis of the building, where you can clearly see the three shells nested inside one another.

This image shows the transverse section, made by cutting at a right angle.

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Sou Fujimoto Final Wooden House
Location: Kumamoto, Japan
Design Year: 2005-2006
Construction Year: 2007-2008

Looking at the house in plan: the 11 levels, or “cuts” or the sections (vertical cut, image below) representing different spaces.

There are no separations of floor, wall, and ceiling here. A place that one thought was a floor becomes a chair, a ceiling, a wall from various positions. The floor levels are relative and spatiality is perceived differently according to one’s position.

Hands-On Exploration: LEGO® builds

Modules and Repetition

Modular systems are an integral part of architecture, from the early developing stages to construction of the actual building. **An example of a modular system is the brick**, be it the LEGO® brick or masonry.

By repeating the module of a brick you can create much larger structures based on one simple module or the combination of different modules. Even very complex structures are often constructed with a number of simple modules in a **systematic repetition.**

Imagine a module that represents a room with a window.

The simplest form of repetition is linear: in that way we create a three-room apartment.

The modules can be repeated in horizontal and vertical directions to create a facade consisting of 12 three-room apartments.

And we can introduce new elements with different intervals of repetition, adding balconies and different size windows.

The exercise for you to explore Modules and Repetition:

1. Make a number of small sketch-models to represent your understanding of a **module.**

   Our module is a 2x4 brick with one added LEGO brick on both sides. Our module now is five LEGO bricks high and has the same dimensions, whether we place it upright or on its side.

2. Take your module and build a **structure** with it. Every building/structure built by repeating the same module is modular.

3. Imagine that each module is a living space (unit). Elaborate on your model by adding details that represent the function of each unit.
4. You can combine the units (modules) in different ways in your building. Modular designs allow for flexible arrangement and a variety of uses.

   Imagine how different modules of your building could be combined together.

   You can establish the scale of the building by adding details with sketching.

Modules and Repetition

Exploration via LEGO examples based on Willis (Sears) Tower, designed by SOM.

Willis (Sears) Tower

A basic module of the Willis (Sears) Tower can be abstracted in LEGO bricks with a 1x1 plate.

One plate represents a square with dimensions of 75 feet by 75 feet, with a height of two stories.

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The modules are stacked into nine tubes with a height of 25/33/45/55 LEGO® plates (which corresponds to 50/66/90/110 stories).

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The tubes are arranged into a rhythmic composition: the seven shorter tubes are wrapped around the two tallest ones, creating a form that is not only structurally efficient but also appealing.

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Hands-On Exploration: LEGO® builds

Surface

A **surface** is any figure having only two dimensions, defining the boundary of a solid. The **surfaces** of the building are its skin, which encloses and shelters the spaces. The outer **surfaces** are the "envelope" of the building—it is the first part of a building we see; it is one of the key components that determines a building's expression.

A flat or level surface is a plane. Surfaces can be horizontal, vertical, or at an angle.

But surfaces can also be curved, freeform, or complex. Here we show a single curved surface.

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The solid envelope of this building is constructed with only one folded surface.

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The exercises for you to explore Surface:

1. Make a number of sketch-models that represent various surfaces. Use as few bricks as possible.

   In our example we have chosen a flat surface to start with.

2. Use the surfaces in different ways. You can add texture or pattern to it, or raise and fold it (just like a piece of paper).

   In our example, we have added texture with grille plates and raised the back two rows, so it appears that the surface was stretched and bent. We have chosen to change flat, square LEGO bricks into smaller bricks to make the transformation appear smoother.

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3. You can take a picture or scan your sketch-model into your digital device, and sketch the landscape around it. What does your building represent?

   We imagine our model represents an office building placed next to a street with parking in front; the form of the building relates to the landscape around it.

The surfaces of the landscape can be a source of inspiration for architecture.

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Surface Hands-On Exploration with MAD Architects

We asked MAD to give their interpretations of **"surface"**, expressed in a three-step exercise utilizing the LEGO brick.

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1. Build models that express the topic of surface. Try to use as few bricks as possible.

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2. Rebuild your model while transforming it. The transformation of the model should aim at creating volume and space within the **surface**.

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3. Now rebuild your model into an architectural expression. Is it a building, a city, or a design object? Imagine how your model turns into an architectural project.

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Hands-On Exploration: LEGO® builds

Mass and Density

Mass is the physical volume or bulk of a solid body. Mass and space are the basic formal elements of architecture. Architects organize these elements into an ordered form through the process of composition. Some buildings emphasize their mass: they look solid or have a "heavy" expression, while some buildings depend more on space expression, making them seem light and airy.

Density is the distribution of mass per unit of space. In architectural understanding, the term density refers either to physical density—as concentration of physical buildings in a certain space, or perceived density—which is an individual perception of relations between the space and people.

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Exploring the parameters with the LEGO® bricks:

If you have two piles of bricks, each containing 20 bricks, you can build two sketch-models—one almost twice the size of the other.

The larger sketch-model will feature gaps in between the bricks and in an architectural understanding be less dense than the smaller sketch-model containing the same number of bricks.

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The exercises for you to explore

Mass and Density:

Imagine that every LEGO corner brick represents a single-family house.

If you have to house 18 families, the houses can be arranged in different ways, presenting different densities.

18 LEGO corner bricks arranged as free-standing single-family houses on large lots.

18 LEGO corner bricks arranged as multi-family residential buildings (apartment buildings).

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or as a high-rise

Note that each type has its advantages and disadvantages. One takes up more space, while others are denser but can provide larger open areas for rest, recreation, or other public use. For example, stand-alone houses take up the most space but provide more privacy. The highrise allows for more public space around it.

You don't have to follow an established typology. Architecture is a constant search for new solutions. Conduct your own exploration.

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Mass and Density Hands-On Exploration with Architects Tham & Videgård

We asked architects Tham & Videgård to give their interpretations of the **"mass and density"** parameters using the LEGO bricks. The same three-step exercise resulted in the following examples:

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1. Making a prototype that expresses **mass and density.**

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2. Adding context to the selected prototype.

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3. Developing the prototype into the architectural expression.

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Hands-On Exploration: LEGO® builds

Symmetry

The Egyptian or Mayan pyramids are classic examples of **symmetry**. If you place a vertical plane (flat surface) through the center of a pyramid plan, parallel to one of its sides and compare the two halves, you will see that they are identical and could be mirrored over the center axis.

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If you look at the floor plan of the Kukulkan's Pyramid in Chichen Itza, you will discover that a line drawn through the center of the square floor plan, parallel to one of its sides, will divide it into two symmetric halves. A line, drawn diagonally from a corner through the center to the opposite corner will divide the floor plan into two symmetric triangles.

A symmetrical design embodies a sense of balance, or equilibrium. Symmetry is often used in classical architecture to impress: it conveys order and has a monumental appearance.

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The exercise for you to explore Symmetry:

In order to understand symmetry, it is good to start with the opposite: a simple nonsymmetrical LEGO® composition. Make a simple LEGO sketch-model that is non-symmetric (like the example on the left).

By mirroring the image of the sketch-model you have chosen, it will form a symmetrical structure, which is symmetric from two sides (from its front and its back side). This is called bilateral symmetry. Do you know any buildings in your city that have this structure?

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If we mirror this sketch-model again, we get an object that has two orthogonal planes of symmetry. It will become symmetrical from four directions: its front, its back, and its sides.

Or you can take the first sketch-model and join four of the same structures together, rotating them by 90 degrees: the new structure will have rotational symmetry. Rotational symmetry makes an object look the same after a certain amount of rotation— in this case, 90 degrees.

What architectural structure could that represent? Try to add context to your LEGO sketch-models to understand the influence of symmetry.

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Symmetry Hands-On Exploration with Safdie Architects

We asked Safdie Architects to give their interpretation of **"symmetry"** using the LEGO bricks. It was a three-step exercise:

1. Make some LEGO sketches that express **symmetry.**

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2. Divide your model into two and rebuild it, exploring **symmetry.**

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3. Develop your model, thinking of the architectural expression.

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Building Techniques

The selection of LEGO bricks provided with this set will help you to translate your ideas into LEGO sketch-models. You are not required to have any specific knowledge or expertise in building with LEGO bricks. Your creative journey starts the moment you set your first two bricks together. You decide the size and complexity of your LEGO construction. To help you in your creative process, we would like to provide a few tips on the building techniques that you may find relevant when designing houses or other structures.

Technique #1: LOCKING

Placing one LEGO® brick across two others seems simple, but it's one of the most important building techniques to know. By **LOCKING** two or more bricks together with one that lies across them on top or underneath, you create an assembly that can hold more weight and stay connected better. The more you lock the LEGO bricks in your model together, the stronger and sturdier it will be!

When placing windows in your building, for example, it is important to lock them before going to finish up the roof or going to the next floor.

Technique #2: SIDEWAYS BUILDING

Now we move from one of the most basic LEGO building techniques to one of the most unusual ones. Most of the LEGO bricks in your collection have studs on top and tubes or holes on the bottom so that they can be stacked on top of each other. Some less common pieces, though, have studs or holes that point in different directions.

Thanks to these special LEGO elements, your creations don't have to just be built straight up and down. Try adding bricks that stick out on the sides, then build out from them to add even more details and shapes to your models. This extremely useful technique is what we call **SIDEWAYS BUILDING!**

When it comes to adding details to your model, like these windows, the sideways building technique is unique.

Technique #3: SIZE-SCALING

Size-scaling is all about taking something **BIG** and figuring out how to build it **SMALL**. An expert at this technique can look at a collection of LEGO bricks and choose the piece that's exactly the right size, shape, and color to represent an important detail on a model. You may be surprised at how some of the more unusually shaped LEGO bricks can be used in microscale building!

The size-scaling technique is also useful if you want to show how your building looks in existing surroundings: for example, a part of a city.

Technique #4: DETAILS

Details are **CAREFULLY CHOSEN LEGO ELEMENTS** that don't have to be important for your model's strength and stability; instead, they **HELP TO TELL YOUR CREATION'S STORY**. With the **RIGHT DETAILS** in place, people will be able to tell what your model is all about, just by looking at it. **SO CHOOSE YOUR DETAILS WISELY!**

Details don't necessarily have to be on your model: details can also be used to show the surroundings.

Technique #5: ALTERNATIVE USES

Do you know what you want to build, but you can't find just the right piece to build it with? Then it's time to **GET CREATIVE WITH ALTERNATIVE USES!** First, spread out your bricks on a table and examine them. Pick them up, flip them over, and really look at them from every side. You might just find one that would be perfect for the job if you use it in a way that you haven't thought about before: maybe attaching it with sideways building, or upside-down, or combined with another piece to make an entirely new shape.

The more you **PRACTICE BUILDING WITH YOUR BRICKS IN NEW WAYS,** the better you'll be at finding alternative uses!

By using the jumper plate, you can offset the columns between the studs, and achieve more realistic spacing of columns.

JUMPER PLATE

The jumper plate allows you to push the window and the door back (inside) by half a module, making the structure look more realistic.

Technique #6: BUILDING IN SECTIONS

Large, thin pieces can be tricky to build directly onto the main body of a model. You'll often have better construction stability if you build a **MULTI-PIECE SECTION** like this spaceship's front end separately and then attach it when it's done.

When doing buildings where big parts are hanging out, it is a good idea to split the build, and make subsections before you assemble the model.