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The Hidden Geometry of the Architecture of Herzog & de Meuron
Digital Tools and Design Practice

Alexandra Castro

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FACULDADE DE ARQUITECTURA

Alexandra Castro. The Hidden Geometry of the Architecture of Herzog & de Meuron, Digital Tools and Design Practice

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The Hidden Geometry of the Architecture of Herzog & de Meuron

Digital Tools and Design Practice

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Jacques Herzog

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Jacques Herzog.
Founding Partner of HdM together with Pierre de Meuron.

“We are surrounded by things that exist, but we don’t see them, we don’t hear them, we cannot smell them...”

Conversation with Jacques Herzog

FaceTime video call, Porto-Basel, May 6, 2021.

FaceTime video call, Porto-Basel, May 12, 2021.

FaceTime video call, Porto-Tenerife, June 3, 2021.

Alexandra Castro (AC): In the text you wrote in 1988, "The Hidden Geometry of Nature", you opened it by explaining that: "'The Hidden Geometry of Nature' [...] is the expression of an approach, a search for perception and meaning, a search of something hidden, something that is integral to nature, that occurs in nature. A search that must fail at the moment I believe I have found my geometry."

Is this statement still valid for you today?

Jacques Herzog (JH): Well, coincidentally, I have been reading some early texts again. They are a mixture of romantic and poetic and, of course, they reflect a moment of research when a young architect tries to find a way into the world of architecture.

I was always fascinated by the natural sciences. I started studying biology and chemistry before architecture and at ETH Zürich I also took classes in crystallography. I was interested in understanding how crystals come to exist as a result of ideal conditions where they can literally express their inherent geometries. Each matter, each chemical element, has its own geometrical structure that sometimes becomes visible but very often remains invisible. Nevertheless, it exists. We are surrounded by things that exist but we don't see them, we don't hear them, we don't smell them.

We humans live in a world of which we understand just a small part. This is also a subject that painters deal with when trying to paint landscapes. The deeper they go into painting a landscape, the more they understand that they can hardly paint a stone or an apple. Think of Cézanne, for instance. Painters become desperate because the closer they come, the more naturalistic they try to be, the less they are successful and they always understand that they just scratch the surface.

Under the influence of artists, especially Joseph Beuys, we also tried to explore the potential of invisible forces on materials, such as copper, wood or stone; materials that have a long tradition in the world of architecture but were always used in a conventional way. Normally, architects use materials for aesthetic reasons or because the practice dictates how to use them. We tried to change this—to

expose the “hidden nature” of materials. There are also hidden qualities within the built world, in traces of human behaviour. In the built form, you can read social behaviours. Once it is built, architecture expresses something psychological physically: social and psychological patterns. You cannot visualise psychology, you cannot visualise people's character, but these are expressed by people's own way of living, by how they decorate themselves and how they build cities.

AC: I remember that, once, talking about the experience associated with architecture, you mentioned that it leaves a mark on us and reminds us of our own story. In a way, this reinforces the fact that architecture has a kind of an aura or spiritual quality, let’s say, from which all these elusive emotions emerge.

JH: Yes. To put it simply, many things exist, though we don't see them, we don't hear them, we don't even smell them, but they exist nevertheless. They are real and affect us all. We cannot make successful architecture if we do not try to understand such phenomena, even if they are not visible. To smell, hear, taste and touch are basic human senses—they offer a great potential for architectural design. “Time” is also invisible, but it affects us all and transforms everything.

AC: Resuming the topic of geometry, what role does geometry have for you in architecture?

JH: For architects in all centuries, geometry has been an important tool to construct something and introduce a sense of proportion and relationship between the different construction elements. We still use this tool very actively. Sometimes, you make a circle to inscribe a space so you can understand that this circle also defines the edges of another wall that is adjacent, you work with a symmetrical axis or you try to establish a grid pattern. These are simple geometrical tools that help you to orient a space, to provide a certain stability or instability. We still use geometry to draw a plan, as it is necessary with analogue tools, such as a real pencil, a pen and all those elements that are very physical.

The use of the computer today reduces the importance and significance of geometry as a tool to create order. The digital computing system can do anything. A circle? A triangle? All quite easy for the computer. Geometry has lost its importance versus algebra, versus the digit, as the history of mathematics tells us. Geometry led in the beginning, but in the course of time algebra has taken over and became more dominant. The digital era has underscored this dominance of algebra over geometry in a pronounced way.

AC: From a theoretical perspective, we may speak about geometry as a kind of device that enables architects to materialise in the architectural object a specific conceptual idea or a relationship with something in particular. Suppose we consider the Ricola warehouse in Laufen and the National Stadium in Beijing. Even though they are very different, do you think it is possible to make an analogy about how you worked with geometry in both projects?

JH: As an architect, when we were building the Ricola warehouse in Laufen, we would not have been able to imagine the complexity of the stadium in Beijing. It would have been impossible because we did not have the technical tools to visualise and construct it, but also, in our minds, we were not able to imagine such a thing. On the other hand, today, we would no longer be able to go back to create

something so modest and simple but, somehow, magic and powerful as the Ricola warehouse. I think that the time that has passed between the two architectures is more decisive than the evolution of the technical tools. Time transformed—and is constantly transforming—our minds and how we perceive things.

AC: The Ricola warehouse is a classical building that comes from hand drawing. It has a very Cartesian composition, it is symmetrical, and it recalls, somehow, an order. On the other hand, the Beijing stadium is a post-digital building with a highly complex structure, apparently with no rules. However, you departed from a clear, conceptual idea that somehow guided the design process in both. In the warehouse, you tried to accomplish the idea of the stacking shelves and you also searched for a relationship with the quarry based on the concept of layering. In the stadium, you decided to take the Chinese cord as a reference for the overall shape of the building, so a significant part of the design process was to translate it into a buildable form, trying to find a very rational and controlled system within a seemingly accidental arrangement of elements.

Hasn't geometry played an essential part in the concrete accomplishment of both conceptual ideas?

JH: I don't think that geometry was ever at their basis, but to take geometry as a tool to compare both designs is not uninteresting. I think the Ricola warehouse is conceptually so interesting because, at the time, it was totally new to do something which, as you say, has a kind of classical aspect. From a certain distance it looks almost like a Florentine palazzo of the 16th century but, when you come close, it falls apart in bits and pieces. Every piece is given the same importance: the consoles in wood, the vertical and the horizontal boards. It is just a pile of boards, actually.

The building in Beijing is more an expansion of a large form. It is more like a crystal that grows out from inside, based on a precise plan. The Beijing stadium may have suggested an association to a bird's nest for many people, but, actually, it is open to other associations as well.

AC: Frequently in your projects you explore a kind of compositional freedom that seems to aim to preserve, in a certain sense, the spontaneity of the creative gesture. This is visible in the New North Zealand Hospital, where you have this kind of flower, in the first Roche tower with the two intertwined helices or, going a little further back, in the undulating Cottbus library. But you also explore systems in which you search for an accidental or unruled appearance, such as the many stacking projects where you wanted something random or undefined.

What do you think about the relationship between geometry and compositional freedom?

JH: In classical periods, like the Renaissance or Baroque, architects not only used geometry for construction but as a kind of demonstration in praise of geometry itself—geometry as a way to demonstrate the achievement of human genius to transcend nature—even if, as I said earlier, there is a purity of inherent geometry in natural crystals that the architects never achieved at that time. However, geometry was a reason for architects to express it. Think, for instance, of "Revolution architecture" and its appraisal of the sphere.

In the project for Berggruen, we use the pure sphere that may be seen as a leftover of this thinking. I am interested in the sphere for different reasons. I think it is one of the most beautiful forms; perfect and pure. But also one of the most stupid forms; not, really, ideal to turn into architecture. It is so difficult to hold in place and to create access into it. It always needs a socle or something equivalent. For Berggruen, we propose a new interpretation; not a socle, but a large frame that holds back the sphere from rolling down the hill. It therefore involves, also, some randomness and playfulness. Like the stacked cubes balancing above each other in the Leonard Street tower in New York.

AC: I think that a very interesting example is the corner of the Tate Modern extension, which was one of the most challenging geometric details of the whole design process. You had the regular grid coming from the brickwork that, when combined with the twisting shape of the pyramid, made it difficult to have a sharp and perfect corner. So, you opted to express this incompatibility in the facade, and, as Wim Walschap mentioned, you searched for a bent solution where the corners would be irregular. And it is particularly interesting to notice that the detail in which you wanted an imperfect or undefined appearance was where you spent more time working on geometry. You had to define the rule, and I know that you spent more than half a year searching for the right solution.

JH: Exactly. That is a good point. Geometry there is very complex; we do not express perfection like architects in historical periods would have done, but quite the opposite: randomness, even failure! This is not because we are romantic and adore decay as an inevitable human fate, but simply because it adds something fragile, less monumental, to the whole building. Something more approachable for people.

AC: In "The Hidden Geometry of Nature", you mentioned that: "the relationship to preexisting architecture and building form is unavoidable and important [because] architecture has never arisen out of nothing." And you added that architecture should be built in pictorial analogies, having as reference the preexisting reality made of all the images that one carries of the city, building forms and building materials.

Does this mean that, for you, architecture is the result of an appropriation process?

JH: There is so much architecture around us, so much world and knowledge around us, that we cannot say we are totally innocent and nor is our mind ever a blank sheet of paper. So, obviously, we are somehow influenced by something.

If you, for instance, are now designing the project for a house and you build it within a year, the project will be different to if you had been asked exactly the same thing five or ten years earlier. You have changed, the world around you has changed, and the information available around you has changed. Architecture is strongly linked to the existing world, and it is good to be aware of that; [an] awareness of all the images that we carry with us. I like architecture that reflects the origins of that artistic consciousness. Architecture is the creation of something new, but consciously based on preexisting architectures, preexisting stories and images.

When I wrote the text you mention, I was very much inspired by images. Almost obsessed, I would say. That was like an interior film. I was a young architect and had not built much yet, so I was very interested in pushing forward that inner film as something different from what the previous generation had in mind. Architecture is a generational discipline, in the sense that a new generation carries different images from the previous one. So, in the early years of my career, this also worked as a kind of a fight against what had been done before. I wanted to get rid of the images that were confirming the existing design world. My text is the expression of a kind of iconoclastic or anti-iconic impulse that I tried to send out into the world of architecture of that time.

AC: I mentioned this quote because, when looking at your buildings, we may find many references to other things that come from the surrounding context or that you somehow found on the site. Once you stated that "you do not have the desire to set up new establishments, but on the contrary, you want to pursue existing perceptions in order to complete the city". Is it this wish to search for relationships with the context or, at least, trying to find the right architecture for each place, that explains the constant heterogeneity of your buildings?

JH: Obviously, every place is different, and time changes, so our architecture shows this whole latitude of differences. In our latest project in Basel, the Stadtcasino, we decided to use the preexisting architectural language, which was the more classical language of the 19th century. The preexisting building has a strong identity, and we wanted to enhance that. That is why we conceived the addition (large foyer spaces which double the total volume) in the same language. A perfect simulation but carved in wood and not in stone. It would have been stupid to apply a modernistic language in that historical city context.

AC: Even though this relationship with the context in your architecture is hardly very direct and is sometimes even established by opposition, there is always the desire to find the right architecture for each place, an architecture that sits well on the site.

For instance, in Tate Modern 2, after trying out some versions of the building that were kind of forced for the place, you realised that you had to dialogue with Gilbert Scott. So, in the end, you opted for a building that fitted the site and made sense for Tate Modern as a whole.

JH: Yes, it was the right decision to conceive Tate Modern 1 and 2 as one whole museum complex. One architectural whole that could also express its materiality: brick. The brickwork is different from the former power station but actually in a dialogue with the architecture of Gilbert Scott, which also makes it look very different from the buildings in glass and steel surrounding the Tate like an ocean of ubiquitous towers.

AC: Is it important for you, when you have a commission, to visit the site, go around, get to know the city, the people, the culture, and the architecture?

JH: Yes, everybody knows that this is important. But I am not a fanatic who would pretend that I need to sleep on the site or be there half a year in order to find inspiration and familiarity with a site. Genius Loci is nonsense, I think. But it is good to visit the site for real: to be exposed to the climate, to

understand how the sun moves, to walk around and to watch people on the street. Especially for public projects, it is key to understand how people use public space.

AC: In an interview once you referred to Andy Warhol, describing him as an artist who transcended categories and used his work to say something new. And you explained that this is exactly what you are interested in: to use well-known forms and well-known materials in a new way so that they become alive again. You added that you "would love to do [...] architecture which looks familiar, which does not urge you to look at it, which is quite normal, but at the same time, it has another dimension, a dimension of the new, of something unexpected, something questioning, even disturbing." Can we say that this particular way of looking at form and matter and exploring both in architecture is one of the constant interests of your design practice?

JH: Probably, yes. Things tend to become invisible and uninteresting over time. A door handle, a material surface, the shape of a window. This all seems so evident, the same appearance, over and over again. Kind of a bore. But sometimes it just needs a small shift in shape or colour, or how a material is presented, to inspire some fresh aura, a new look at things. This can also happen with people you live close to—your wife, your husband or even the friends you have known forever. You don't see them any more. So, sometimes, you have to reinvent how to look at a person so you become aware of how much you like or dislike her. All that is rather based on your own perception than on factual truth. In other words, we can change our point of view, our perspective. This can be very inspiring and healthy!

AC: In what concerns the geometric complexity of the projects, we may see a general overview of your work as like a steep curve that grew over time, having had its apex around 2008, with the Elbphilharmonie as the most emblematic project. In recent years, it seems that geometric complexity is decreasing, and compositional strategies are being directed towards a new simplicity, visible in projects such as the Triangle, Vancouver Art Gallery, or the Berggruen Institute. What is driving this return to a new simplicity?

JH: Maybe our most recent architecture is again more rigid and based on symmetry and pure geometries, but it could change again at any moment. We have had moments like the Jinhua architecture park, where we developed an algorithm that produced countless different 3D constellations, from which we could pick those we found appealing and appropriate. Just like when you watch cloud formations in the sky. A design strategy quite far from control and authority. I am always interested in how we can produce form. But I have no preferences for this or that method, approach, style or taste.

AC: In "The Hidden Geometry of Nature" you also wrote about "Presentation", where you criticised neutral white models and naturalistic perspective drawings, explaining that "thinking about the presentation of an architecture is identical to thinking about the architecture itself." Is this idea about the representation of architecture still valid for you today?

JH: Representing, describing, simulating architecture outside its built reality remains a challenge but also an intense topic I constantly learn from. Each time we plan an exhibition, we are somehow in a deep crisis because it is such a challenge. Architecture is what is out there. Exhibiting it is mostly boring. Of course, in the last 20–30 years things have changed. You can now do simulations with the computer that you could not do when I wrote this text. At the time, the tools you had as an architect were the white models that were very deceiving because they provided just a very neutral idea of the project, and then you had these perspective drawings which were like a discipline on their own. So, from very early on, we have developed many different ideas using, for instance, video. Maybe our most interesting and sophisticated example of analysing and exposing representation is the "Lego House", where we used existing Lego bricks from our childhood. In an accompanying text I describe the fragments of real and imagined worlds coming together with this Lego project.

AC: What about your E, D, E, N pavilion?

JH: The physical model on the table looked just like a conventional model of an architectural project but its projection on the wall revealed the word E, D, E, N, produced by the shadows of the four columns.

AC: What about your first Venice Biennale exhibition at the Swiss Pavilion in 1991?

JH: Architecture is so complex. It is physical, three-dimensional and so large that you cannot actually exhibit it. You can only exhibit aspects of it or become aware of that fragmented reality with which you also deal. That remains, I think, a very important moment of our thinking. When we were asked to present our work at the Venice Biennale in the Swiss Pavilion we did not want to present our own viewpoint of the work, but, rather, we wanted to exhibit the viewpoint of other people. We invited photographers to look, in their own specific way, at our work. A building photographed by different authors produces totally different ideas and viewpoints of the same building.

AC: From your comments in this text, but also in two more conversations you had with Theodora Vischer in 1988 and 1993 about this same subject, the idea emerges that, for you, the means of representation are technical instruments that serve to translate an abstract idea into the rational world of shapes, but they should also be explored as tools of expression to investigate the individual character of a project and communicate a particular insight into it.

In my opinion, this is what explains one of the most particular features of your working methodology: the fact that you are always searching for—or including in your design process—alternative modes of representation and exploring them in accordance with your very personal way of looking at architecture. Do you agree with this?

JH: Yes, I can see that. New tools, such as VR and AR, are again opening up new paths that we are about to explore quite a bit. These are, again, just tools, instruments, but they help us understand what we want to achieve with a specific project, what we actually want to achieve with a piece of architecture.

AC: In what concerns this very personal way of using the design tools, two examples come to my mind. The first one has to do with physical models and how you intensely explore them, almost as if you were trying to exhaust all the formal possibilities of a project. Once, you mentioned that you often try out stupid things because you never know where it will go, and sometimes it leads to unexpected results.

JH: That's true. I think that sometimes you discover something perchance; coincidence can be a strong actor. That's why I do not like the teams to always come up with finished models. They should make them more unimportant and just do a few volumetric studies that we can tear apart and reassemble. When you are developing a project, it is important to keep it open; you should not restrict it. It should be free to evolve so that it can grow and it can navigate your own thinking in different directions.

In this we can also learn from children. It's better to not always teach a child to do exactly what you already know and what you believe should be done. Otherwise, you don't give it a chance to evolve in an unexpected way. Isn't that the goal: revealing unexpected truths?

AC: The other aspect that intrigues me has to do with the pixellation process that you explored with particular focus in the late 1990s in projects such as the De Young Museum, TEA or Puerto de Santa Cruz. Can we say that this technique has suggested to you a specific compositional strategy in architecture?

Once, you talked about this as a "language [that allowed you] to speak with great freedom." And you added that "Just as a painter discovers a language, and then the work explodes on the basis of a vocabulary, so this is what happened to us with this geometrical system of extruded pixel structures."

JH: For Tenerife we wanted to create a whole new urban landscape, not just a collection of individual buildings. That is when the idea came up to underlay a raster of pixels as if the whole site were a large photo. That photo could have been a picture of anything—we were not interested in the subject that was represented but just in the fact that it was creating a raster image that we could extrude vertically in order to create a three-dimensional landscape. This fictional landscape then could be manipulated, carved out, cut, sliced, etc., according to the programmatic and functional needs for the building it should become. Each building was different—cruise terminal, shopping mall, cinema, hotel, marina club—but all of them related through their underlying pixel raster.

The design process was quite new and interesting. I did not feel under the pressure of an author bound to create form but rather like a DJ arranging form. I think artists like Gerhard Richter chose similar photographic methods which allowed them to paint without the need to invent motifs and form.

AC: Over the years, you have always combined, in your working methodology, a great variety of tools and means to support the development of the design.

What is the value in not limiting the design process to a couple of tools but, rather, to develop it using an eclectic method that combines many different techniques?

JH: The variation and multiplication of working methods is just a crutch for me in order to find a path which eventually leads to a piece of architecture. I always rejected “style” and tried to minimise personal traces. This seems like a good way to find specific solutions for the many different places and programs architects have to work on. But I am quite aware that it is not the only way an architect can choose. Often architects are known for their personal style—think of Mies or Gehry or Zaha Hadid—who have realised great works of architecture in places very different from each other. Obviously, there is not just one recipe for good work, but quite a few.

AC: But I suppose that working with so many different design tools at the same time, like plans, physical models, virtual models, images, sketches, renders, or composite images, is what allows you to have different insights into the project. Each tool shows you a different perspective on the architectural object.

What is, for you, the advantage of working simultaneously with analogue and digital processes?

JH: I like speedy design processes. I often take whatever is around—paper, pencil, mobile phone, leftover magazines or newspapers, wood, matches, collages—so I can get an impression of how good first ideas are when being assembled. Once I get the feeling it is right, the team can take it further and develop more sophisticated forms of representation.

AC: Once you said in an interview that the models are testimony to an archaic understanding of body and reality, to which you opposed virtual images, explaining that as soon as the architecture is restricted to visual experience it is dead.

Is the analogue what provides you with a sensual and tactile approach to architecture?

JH: I don’t care what the tools are. The tools don’t have to be sensual and tactile, but eventually the resulting piece of architecture does. As I said, I like to go forward very fast. With impatience. If the sketches and models which are being produced go that way in the design process, well then, this is much better!

AC: We mentioned before the fact that, over the years, we may find in your architecture clear moments in which you were investigating different compositional strategies. At the same time, from 1978 to recent years, technologies dramatically changed and the office, in a way, has followed this evolution by gradually integrating them in the design practice.

Do you think that, at some given moment in your career, means of representation may have influenced your architecture by making you look at it in a particular way, or simply by opening up new possibilities and therefore allowing you to move forward in new directions?

JH: For sure. We can now use VR and walk around in our buildings before they are built. As you walk around there with your headset you discover more things than ever before. That clearly helps you to discover things that you normally wouldn't have seen. It is a new tool and a very efficient one. But I doubt whether it has changed what one might call the inspiration that is often still needed to get a project started.

AC: Maybe it interferes with how we address the design process and manage to master, through representation, the architectonic object as a whole. I think that the shift between 2D and 3D is a clear example of this.

In the eighties, when talking about the relationship between the parts and the whole as a quality you consider fundamental to architecture, you gave the example of the Stone House in Tavole and mentioned that this unity could be achieved if the plan form and the cross-section were expressed as geometrically equivalent. This particular way of talking about architecture, in my opinion, is deeply bonded to hand drawing and the period in which the means of representation, mainly based on 2D projections, somehow limited the design process to a bi-dimensional approach. In contrast, around 2004, when thinking about the Jinhua structure and other projects of this same period, such as the Vitra Haus and Actelion, I think that these could hardly have been imagined without the three-dimensional approach to the shape provided by the computer and, in particular, virtual modelling.

Do you think that this shift from 2D to 3D has somehow changed how you addressed form-making?

JH: You mentioned the right projects. Jinhua was an exercise purely based on computer modelling. There, we again created a geometrical pattern, an algorithm, actually, and we let it walk; we let it fly like clouds, as I told you. Then we said: "Stop! I like this image." Or "Stop! I like this one." It was a somewhat random way of form-making, and it goes back to what we have been discussing before. But I think it is the only project with such a strong degree of dependence on the computer.

In the Tavole House, the very strong similarities between the section and plan come from a fascination I had. It solved, literally, something I admire in archaic architecture, for instance in cathedrals, where you see that one material dominates everything and the outside reflects the inside, and vice versa. Many of our projects have this strong relationship between structure, space and facade, where all these three fundamental architectural categories blur into one single whole. This concept is not bound to a specific methodological approach.

AC: When looking at the evolution of the office, we may talk of a stage when the "Digital Technology Group" was established, around 2005, and the computer started to be used as a computational tool. In this period, scripting and parametric design allowed you to handle the high level of geometric complexity that characterised, at the time, many of your projects, such as Ciudad del Flamenco, Elbphilharmonie, or the first Roche Tower.

Were these digital technologies fundamental for you to move forward with your research interests? Would it have been possible to develop the ornamental pattern of Ciudad del Flamenco, as you had in mind, or even to build the Tate Modern brick facade, without the scripting?

JH: For all these projects we definitively needed the DT tools established in our firm. It is obvious for Ciudad del Flamenco, though Tate Modern is special. I never understood the need for a computer for that facade. But the amazing thing is that every brick on the construction site was put in place as if a

computer put it there, like a video game. Yet, in fact, we didn't want to achieve anything else other than a super archaic, simple and straightforward brick facade for that building.

AC: This is exactly what I find so fascinating about this building. It has a very traditional appearance, it is made of bricks, and, still, it has a lot of technology behind it that was crucial for making it buildable.

JH: I think that's a very good way to end the conversation: with a paradox. We still like straightforward architecture, which appeals to all our human senses.

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