

INTERVIEW WITH RAPHAËL ZARKA

CÉCILIA BECANOVIC

Cécilia Becanovic
is an independent curator.

CÉCILIA BECANOVIC In 2003, you showed a series of photographs, entitled *The Forms of Rest*, at the Vasištas Gallery in Montpellier (France). In the press release, the art critic Albert Asthom quotes Borges: "It's almost to insult the forms of the world to think we can invent something or even that we need to invent anything". These words seem to be particularly important to you.

RAPHAËL ZARKA Since Albert came across that sentence (it comes from Borges' discussion with Victor Burgin), it has become something of a motto for me. It seems to me that expression, imagination, are only a matter of editing and collage. I seriously doubt the possibility of creating something out of nothing or, to be more precise, I doubt that it is possible to produce any genuinely original or individual piece of work. If you think you live in a finished world, then the whole number of shapes and possibilities must be finished too. When you look at things in this way, it makes sense that two artists, remote from one another in space and time, might produce similar shapes and thoughts. Let's play with the things that are already here, already around us, rather than pretend we are inventing something new. That's not to say that my work is objective in any way. It's closer to the work of the collector than to typology. I express my subjectivity in the way I select, frame, and edit the world's fragments. I never try to present reality as it is. On the contrary, I'm stressing the fact that we can only ever see the world from our own particular cultural viewpoint.

CÉCILIA BECANOVIC *The Forms of Rest* is a collection of concrete objects that you found isolated in nature or on derelict sites, areas of wasteland. The way you photograph them, these geometrical forms look like unwilling sculptures, like strange monuments.

RAPHAËL ZARKA Monuments? Yes they might be. But only if you see them as monuments awaiting signification. Like that flame between two sets of traffic lights just above the Alma Bridge; it didn't commemorate anything before Diana's accident. Or monuments similar to those Robert Smithson photographed in Passaic, New Jersey. Monuments that have been produced unwillingly by their environment but



ROBERT SMITHSON: MONUMENTS OF PASSAIC, THE SAND-BOX MONUMENT, 1967.

that have a strange kind of relationship with it, something paradoxical. I am interested in the gap or the tension between the object and its "scenery". I look for objects that seem to be on display, abstracted from what I might call the asphalt and concrete continuum of urbanity.

CÉCILIA BECANOVIC These images of yours are not metaphorical. The objects are like signs whose signification has been forgotten. They seem instead to operate on a hypertextual level, leading us to other sources, images or texts. Some belong quite clearly to the family of scientific or speculative objects such as the platonic solids that Kepler used in his cosmology, each a regular polyhedron.

RAPHAËL ZARKA All the photographed objects do not operate on the same level. There are those you just mentioned, which are probably the most intriguing. And then there are those that you recognise immediately, but that are to be read on a different level. I am thinking of the inverted staircases: their distortion reminds me of Piranese's prisons, those that Borges thought about as he was building his fascinating City of the Immortals (see *The Immortal*, the first tale of *The Aleph*). There is also the triple skateboard ramp; what interests me there is the origin of its shape, the wave, which is now petrified in concrete.

CÉCILIA BECANOVIC Rodney Graham sees his photographs of isolated trees as portraits. *The Forms of Rest*, half way between sculpture and painting, between volume and one-dimensional image, seem instead to belong to the category of still life. Still lives, that is, on the scale of the landscape.

RAPHAËL ZARKA I've always wondered where the border lies between an object and a space. At first I thought it could be to do with motion, the difference between something you can move, like a piece of furniture (in French, "meuble") and something that cannot move, like a building (in French, "immeuble"), something instead that you move on. I think I've now come to consider all that is fragmented, isolated as a kind of object. For instance, take the Aerotrain track. There is no doubt about it, this is a space, it's eleven miles long. But, at the same time, it doesn't link anything; it's just there in the middle of the fields, its extremities finishing in the void. My photograph of the monorail, the one that belongs to *The Forms of Rest* series, is really the link, or the interface, between my photographs and my videos, between

object and space. I use photography—paying particular attention to scale and the position from which the photograph is taken—to unify very diverse kinds of objects.

CÉCILIA BECANOVIC In the same show at the Vasistas gallery, facing the photographs, you had a sculpture, or rather an object: a wheel cut out of breeze-blocks, inspired by the work of the Brazilian artist Iran Do Espirito Santo. This piece of yours is some kind of manifesto: it makes quite clear the mobile-immobile dialectic that is central to your work. This dialectic is also clearly visible in the collaborative *Pentacycle* project (2002, with Vincent Lamouroux) and, more recently, in the video you shot in an abandoned skatepark built in a particularly dry and wild kind of landscape in the southeast of France.

RAPHAËL ZARRA Before saying a few words about the sculpture you mentioned, I would like to say just one last thing about *The Forms of Rest*. To take a photograph is not something that simply goes without saying: the logic of the “decisive instant” is something I am completely unfamiliar with. The only things I allow myself to photograph are objects with such inherent stillness that I naturally see them as photographs. *The Forms of Rest* are twice-photographed, then, or photographs to the power of two. The same goes for the wheel made of breeze-blocks: it’s a sculpture of a sculpture. As a musician might, I did a cover version of a piece by Iran Do Espirito Santo: a circle cut out from a red-brick wall. I simply changed the material, in the same way as a musician would play music on a different instrument. This piece, along with many others in contemporary art, works like a musical score, or a recipe: if I simply say to you “a wheel cut out of a red-brick wall”, you already have an image in mind. This work is “allographic”: it can be built by the artist or by anyone else. But what actually works in the field of music is mostly theoretical in the visual arts, and I wanted it to make it effective. Yet I didn’t make the piece just to illustrate the theory. Iran Do Espirito Santo’s piece is a work I can really relate to, something I could or should have done... That said, if you look at what seems to be the same piece in the context of one artist’s work and then in the context of another’s, its whole meaning has changed. In my case, the circle is a wheel, not a cut-out, an oxymoron of immobility and movement. That’s why I suggested that Albert cite a passage from Cyrano de Bergerac’s book (*A Journey to the Moon*, around 1657),

where he describes a city on wheels. I focused on this aspect in the video I showed at the Frac Languedoc-Roussillon (*Rooler Gab*, 2004) as well as in the *Pentacycle* video. Indeed, the rules underlying the making of the two videos were the same. I don't just film any kind of contemporary ruin: these are very specific, they are not houses or bunkers, they are spaces dedicated to motion, to speed. The absence, or cessation, of movement makes the immobility of these spaces even more apparent. But in order to record that immobility on video, I needed to establish a standard. And motion is the standard against you can measure immobility. The standard is the *Pentacycle*, the dog.

CÉCILIA BECANOVIC In your words, the Aerotrains track and the *Rooler-Gab* skatepark are "fossils of motion on landscape-scale". It makes me think of what you said about the petrified wave. I think that image describes perfectly this skateboard place on a hill in the middle of nowhere. You say someone walking around there could not even notice the poles of the ski lift. It's the ski lift that gives the project its strangeness: an abandoned ski lift there in the south of France where it never snows. You first went there to take photographs, and you then investigated and met Gabriel Leuret whose prosaic imagination is at the origin of this strange place. You finally chose to highlight the site's disjunctions and contradictions by letting a dog guide you through it.

RAPHAËL ZARRA In that video, the dog is the first thing you see; it's the kind of dog that hunters use in the south of France. At that point there is nothing especially strange. Then, in the countryside, you begin to see aspects of urbanity, then you see the ski lift and the downhill skatepark, and it is then that you begin to understand the dog might not be the main character. I like putting the main character in the background, filming without filming something, showing something while seeming to show something else. It's almost like the story of the finger pointing at the moon: the fool looks at the finger. But we know there is no fool in art: you need the finger for there to be a moon. There is something similar going on in *Landscape where the wind comes from* (2003). I put a tiny video camera on the arrow of a weathercock that I install on the roof of a gallery. It films the landscape in real time, and you can watch the result on a LCD screen inside the gallery space. One way of thinking about it is that the weathercock, that is to say the wind, offers the only way of filming the landscape of our daily lives objectively. Another is that the piece

is mainly a self-portrait of the wind, and that the landscape is only what exposes it (in the photographic sense). To me, the interest of the piece lies in the space between the two interpretations.

CÉCILIA BECANOVIC Taking up the second way of looking at the piece, the landscape somehow plays the part of the plaster that you used to cast the holes in an emmenthal cheese. The title of that series, *The Eyes* (2004), is ambivalent. It can be read pragmatically (cheese makers call the holes in cheese “eyes”) or metaphorically (you are enabling us to see what is usually invisible).

RAPHAËL ZARKA In this new series of photographed objects I come back to the underlying theme of the archaeology of everyday life. The idea comes from the casting technique they used in Pompey; you might remember that famous sequence in Rossellini's *Trip to Italia*. I think that's where I got the idea from. I think a gruyere cheese embodies perfectly the way in which mysteries hide in the most ordinary of things.

CÉCILIA BECANOVIC The heterogeneous aspect of your works, the diversity of the media you use, the fact that you work almost as a collector would, all of this reminds me of a curiosity cabinet.

RAPHAËL ZARKA The collector's curiosity interests me more than the curiosity of the objects. What is most important to me is what lies in between, in the space that separates one object from another. So my notion of the collection is more dynamic. I am not that interested in the aesthetic of the curiosity cabinet; the important thing is the way in which it does away with useless dichotomies such as geometric/organic, form/anti-form, artefact/natural objects. You could define this kind of space in terms of Roger Caillois' notion of “generalised poetics” (poétique généralisée), which suggests a unity and continuity between physical, intellectual and imaginary worlds.

CÉCILIA BECANOVIC Borges and Caillois—both have inspired your written pieces. Roger Caillois turns his scientific research into literature; you turn your practice of skateboarding into a short essay titled *The Forbidden Conjunction* (*La Conjonction interdite*, 2003). I would like you to tell me about the way you use writing in your work.

RAPHAËL ZARRA The *Pentacycle* project is composed of an object (a vehicle), a video and a text (a discussion); if we felt the need for this text, it was not because we had something to prove. We simply knew that nobody else would be able to describe what we experienced, what we observed. The realisation of project was spread over a period of time, and the discussion is more the story of our trip, like a travel-log, than a theoretical text. In 1999, when I was still a student in England, I wrote an essay on Borges that took the form of a short story. I printed 200 copies of the leaflet on a copy machine. It was the biography of Isidore Thomas Beral, a Swiss painter from the beginning of the twentieth century who managed to paint an inverted perspective in a scientific way. I was thinking that in the context of the total freedom that artists have today, there is still one thing that just cannot be done: that is, to create a piece in the past. Only fiction allows you to do that, which is something that artists shouldn't just ignore. *The Forbidden Conjunction* is something quite different. Skateboarding is a subject as well as an excuse for me to do some research. There are artists who copy the pages of the dictionary when they cannot think of anything else to do; my way of making the most of the times when I have no specific ideas is to gather information and notes on skateboarding; it feeds my hunger for research and speculation. Of course, it is not that there are no links whatsoever between my work as a whole and some aspects of skateboarding, but they are not to be found in some kind of folklore; the relationships are subtle, less explicit.

A *RHOMBIWHAT?*

DIDIER SEMIN

Didier Semin is an art
historian. He teaches at the
École nationale supérieure
des beaux-arts in Paris.

We all use, or have used, a banal expression—"It's a small world!"—to greet a surprising coincidence: bumping unexpectedly into a friend in a far-off country, or into long-lost classmate in the work place, etc. etc. Such fortuitous events are not insignificant. They constitute what we might call the *rhymes* of existence, the archetype of which is the discovery of shared tastes, shared pasts, shared fragilities ("me too!") which serve as the prelude to falling in love. But what most of us fail to register is the paradox: we tend to celebrate such wonderful little occurrences with a remark that is *a priori* depressing—that of the exiguity of the world!

Perhaps it is not a paradox after all. It is as if our everyday vocabulary were discretely confirming Roger Caillois's hypothesis: "the idea of the finite, of the enumerable, [is] at once far more difficult to conceive of, and, at the same time, far richer in terms of its rigour, than that of the infinite."¹ It was in 1869 that Mendeleev drew up his periodic table of the elements—the list of solid, liquid and gaseous materials—which together form the sole components of the universe: the structure of matter is such that no new element can slip in between those recorded by the great Russian physician (it is well known that he anticipated a number of elements which would not be discovered until long after his death). Between iron and manganese, which sit next to one other on the table (separated only by an extra electron), nothing whatsoever can insinuate itself: the map of matter has been drawn up once and for all, like the walls of a prison from which it would be pointless to try to escape. Caillois postulates that the magic in the world stems not from it being rich in infinite possibilities but, on the contrary, from this implacable finitude theorised by Mendeleev. It is because the universe has only a limited number of possible combinations at its disposal—evidently the number is huge, but it is not, strictly speaking, infinite—that, from time to time, these rhymes occur. They encourage us to believe in these things having a hidden meaning, in a greater intelligence organising the world around us. Why do galaxies coil in spirals, like water draining out of the bath? Why does the praying mantis, in its looks and its habits, recall with such intensity a cruel *femme fatale*? Why do almonds and their shells look as if they were made in imitation of the brain and its cranial casing, while the forms of certain kinds of mushrooms mimic Priape's glory? Medieval thought saw in all of this what it called *signatures*: the scattered traces of a design at work in things themselves, the echo of the macrocosm in the microcosm, divine tricks or clues disseminated across the chaos of the real that are intended for he knows what to

1 Roger Caillois, "Reconnaissance à Mendeliev", in *Cases d'un échiquier*, Gallimard, Paris, 1970, p.74.

look for. As for Caillois, his pessimistic rationalism saw only the necessary consequence of a statistical logic: a finite number of elements necessarily engenders combinations which, at regular intervals, will resemble and respond to one another. If, as we fear is the case, Caillois's hypothesis is right (that the wonder of happy coincidences is a product of the finitude of the world and not of a supernatural design), then it is quite right that we should attach the highest price to poetics of coincidence which cultivates our sense of life having a meaning. This optical illusion, these fascinating mysteries which the surrealists named *objective chance*, serve—for a second at least—to distract us from the disillusionment that is the condition of humanity in the modern age. It will be for the artists—for those who, since Jarry inserted an "h" and exploded the word, we no longer dare call poets—to maintain the illusion, whether they themselves are fooled by it or not. What we call "art", even in present-day society, is in the end nothing more than an endlessly updated catalogue of the thousand and one different ways of exclaiming, or murmuring, "It's a small world!"—as if that were good news...

Caillois, altogether logically, makes art into something like the collection of the beauty of chance; he loathed the transformation usually implied by habit and etymology. In "A Sculptor's Monologue," which is in fact the confessions of a stone collector, he confides his unwillingness to add yet another artefact to the vast number that already exist: "Of course, I can easily understand those artists who seek to extract beautiful forms from stones. But their art [...] provokes in me I don't know what kind of reticence [...] I have reprimanded myself for it. From time to time a sacrilegious idea crosses my mind: that it would be both simpler and less risky to look for stones that already have a finished form. Like everyone else, I can appreciate a classical Aphrodite, but I loathe to continue the tradition: I hear a demon whispering to me that, if I dared, I'd always prefer the living body and the raw block of marble. And so, in the end, I dare. It seems to me that a number of my fellow sculptors are pursuing the same path, but I reproach them for only beginning to move in this direction. Why not go straight to its extreme conclusion and stop making sculptures altogether?"²

It seems to me that Raphaël Zarka shares something of this sacrilegious attitude, as well as the sense of guilt which traditionally accompanies any sacrilege: he once confided to me in a letter that "if the artist is supposed to be an 'inventor of forms', then, as an artist, I'm

² Roger Caillois, "Monologue d'un sculpteur", *Coeur d'un sculpteur*, op. cit. p.200.

never far from thinking that I'm pretty much an impostor" Perhaps this is indeed the case; if, that is, we have to hear the contemporary meaning of a product of the imagination in the word "invention". But, in the strict sense, that of the Latin *invenire*, an invention is first and foremost a discovery: the law tells us that, even when discovered on someone else's land, half the treasure belongs to whoever found it. The treasures that Zarka goes in search of, and which therefore by rights belong half to him, are nothing other, to put it briefly, than the extraordinary forms left in the wake of modern industry—forms which he collects like so many found sculptures. For example, a contemporary ruin that is slowly fossilizing in the countryside near Orléans captured his imagination for a number of years: twenty kilometres of concrete which once served as a test rail for the Bertin Aerotraine, and which nobody bothered to demolish after the project failed. It is clear, though it is still worth stating, that following the trail of objects such as this has very little to do with the logical paradoxes arising from the work of Marcel Duchamp, those of the *ready-made*, an expression which the inventor of *In Advance of the Broken Arm* himself defined as "*tout fait*". So-called ready-made objects are selected for their lack of remarkable qualities so that they can then serve as the basis for a philosophical speculation upon the founding presupposition of modern art: that, once all aesthetic judgement is declared to be subjective, then everything is susceptible to being art. The objects that Raphaël Zarka seeks, however, are deliberately sought for their strangeness and for the surprising nature of the chain of coincidences which appears to have produced them. The *Surrealist Exhibition of Objects* in Charles Ratton's gallery in 1936, where a melted wine glass discovered on one of the slopes of the erupted Pelée volcano and a bottle-rack purchased in Marcel Duchamp's name by Man-Ray were exhibited alongside mathematical objects borrowed from the Poincaré Institute, gave weight to the idea that a shared spirit of research lent a coherence to all of the disparate elements of a bric-à-brac: in reality, though, there is none; in the end, the perplexity induced by the ready-made has very



Aerotraine T80 (Bertin, 1933). Photograph: Jérôme Bertin.
Aerotraine T80 (High Velocity, 1975). Photograph: Jérôme Bertin.

little in common with the dream of objective chance prompted by those objects traditionally classified as surrealist.

One could say that Raphaël Zarka belongs to an improbable tribe of *postmodern surrealists*: they no longer seek the strange in nature, as in André Breton's time, nor in protected domains such as the world of science or popular culture, but rather in those terrains which, in French, are so prettily called *vagues*³; empty, unoccupied, neglected spaces, left to go to waste by an industry unbothered about erasing the tracks its leaves. A tribe for which, with his *Tour of the Monuments of Passaic*⁴, Robert Smithson might be considered something of a figure-head (in that beautiful narrative, Smithson retraces a bus tour of the sites of his childhood, examining even the most insignificant-looking yard through the eyes of an archaeologist who finds there, as he puts it, "inverted ruins").

A photograph taken by Zarka will give a good idea of what we are dealing with here. I am thinking of that inaugural photograph which he entitles *Forms of Rest*: two shapes made out of steel-encased concrete and abandoned in a deserted port, photographed in the middle of an ordinary morning or afternoon, the weather moderately cloudy—or so, at least, we surmise from the short shadows they cast. Two very precisely constructed polyhedrons, which initially recall the *Fitterbug*, the shape (a cuboctahedron with fourteen sides, six squared and eight triangular) which Buckminster Fuller considered to be one of the original structures of the universe, but which a cursory flick through the mental filofax of your average amateur art historian would soon reveal as the spitting image of a famous mathematical object which figures in Jacopo de Barbari's portrait of the mathematician Luca Pacioli that is conserved in Naples (Pacioli was the author of the treatise on the divine proportions, illustrated by Leonardo da Vinci, which must have fed all of the speculation on ideal geometry by artists working at the time of the Renaissance and beyond). Armed with an encyclopaedia, the amateur art historian would eventually



Jacopo de Barbari
Portrait of Luca Pacioli, 1495. Museo Capotondo, Naples.
Portrait of "Fra" Luca Pacioli, 1495. Capotondo Museum, Naples.

3 "Terreins vagues"—literally "wastelands"—translated, less prettily, as wastelands, TN.

4 Robert Smithson, "A Tour of the Monuments of Passaic, New Jersey", Robert Smithson: The Collected Writings (University of California Press, 1996).

discover what no doubt a physician or a geometrist could have identified straight away: the object is a *rhombicuboctahedron*; it has twenty-four points and twenty-six sides, and belongs to the family of semi-regular polyhedrons sometimes called the Archimedean family, of which there are thirteen members. In Jacopo de Barbari's painting, the rhombicuboctahedron serves in the first instance as a symbol of mathematical perfection. But, for centuries, objects of this type, when they appear in paintings, have also had another function: to evoke that black humour, that disconcertation of the intelligence called *Melancholy*. This is by no means a contradiction. If, in Dürer's angel of *Melancholia I*, countless clues (in the first place a polyhedron, and an irregular one at that, but also the tools, the inscriptions...) encourage us to see it as a deliberate distortion of a geometrical allegory, it is because, in the pre-Renaissance mode of seeing the world, the geometer was considered the exemplary subject of hopelessness, painting everything in dark colours. We used to think—but has anything really changed?—that the geometer's intelligence could unlock the secrets of the functioning of universe, the workings of its wheels, but also that it was incapable of accessing the *raison d'être* of those workings, to fathom their ultimate ends. Attuned to the *how*, but radically deprived of the *why*—for only faith could give him that—the learned man was especially susceptible to madness, to the point where the geometer came to be seen as the archetype of melancholy.

Set down there, on a surface which, we imagine, has never been used for any particularly remarkable activity, the two rhombicuboctahedrons photographed by Raphaël Zarka in a dull light recall that secular iconography...

We might think of them as a monument, as a sculpture intentionally fabricated by a well-informed artist and left there in anticipation of its definitive installation in the gardens of some prestigious edifice. Everything points in the other direction: the steel-encased concrete that the polyhedrons are made out of is beginning to disintegrate; they have been there, unprotected, for quite some time, abandoned. It is the photograph, and only the photograph, which provides the space in which they can be read as a monument—an involuntary monument, a chance monument, one might even say a monument *to* chance. Zarka carried out a brief investigation into sites not far from Sète: but that, we would only find out after the fact, having already been intrigued by the image, we endeavour to seek

out any information that might shed light on the mystery. An indication that these objects were meant to have been submerged the length of the coast to serve as breakwaters, to interrupt the ebb and flow of the currents which, over time, can alter the shoreline or make it difficult to maneuver a small craft. But anything at all, or almost, could fulfil this function. Along the length of the landing beaches in Normandy the allies submerged long blocks of concrete specially designed for the purpose; but they also simply the sunk old redundant ships that the soldiers called "gooseberries". Today, we can find jetties on those beaches made out of cubes of granite that have hardly been worn away, or agglomerates of curious shapes and sizes with four protuberances, apparently factory-produced in Japan, which one of my children once quite perceptively identified as a prototype for the most *stupid form*: a sort of degree zero of any kind of solid, a *mana* of rock, the breakwaters exemplarily pile-up-able any old how. But the objects photographed by Zarka do not belong to any of these categories, they seem to have been produced by a particularly sophisticated operation. Where does this extraordinary resemblance to a motif so deeply embedded in the memory of art come from?

Personally, and without presuming to have done any serious research (which, in any case, there is no need and I have no desire to do), I would tend toward the following Voltairian hypothesis: one day, the committee representing all the inhabitants in the region of Sète voted for funds being released to build breakwaters the length of the coastlines, following the complaints of holiday-makers and owners of properties under threat by the shifting of the sands along the coast. The task is entrusted to an underpaid engineer from some municipal administrative body; weary of designing roundabouts for the past few years, he seized upon an opportunity to distract himself—knowing of multiple rhombicuboctahedrons was far more labour intensive than the other proposals put forward. The project was thus abandoned, the engineer sent back to his cupboard, and the two prototypes left, fabricated but unused, in a deserted corner of an ill-defined industrial zone, toward which (objective?) chance would one day direct the path of Raphaël Zarka.

"You're mad!" a more serious reader might exclaim. No doubt. But this is precisely the virtue of the singular images collected by



Monument au Tétracoda, Maldives
Tetrapod Monument, Maldives

Raphaël Zarka: to awaken the demon of analogy and to provoke endless hypothesizing. To whomever chooses to reject the one where the rhombicuboctahedron-shaped breakwater was born of an engineer's Bovary-esque boredom, I offer another, the product of the imagination of a reader of Roger Caillois: if you want to break a heavy swell, you need an angled shape, which thus discounts the sphere as well as its more or less flattened variations. This leaves the regular polyhedrons (and we have known since Plato that there only five of these, the tetrahedron, the cube, the octahedron, the dodecahedron and the icosahedron), the semi-regular polyhedrons which Archimedes made into a family of thirteen and all the irregular polyhedrons (subjected to the common rule of matter, the number of forms they take may be humanly uncountable, but it is not infinite). A very human inclination for regular shapes, especially if they are to be made in multiples, would, in the end, once the uncountable but still not infinite number of irregular forms has been excluded, leave a list of no more than eighteen forms altogether. Only eighteen! Statistically, it is therefore both necessary and foresable that one day another builder of breakwaters will have recourse to the rhombicuboctahedron, offering the rambling amateur of art or geometry the gift this magnificent coincidence: Luca Pacioli's mathematical object washed up in a wasteland, like a nugget gleaming darkly in a pan of mud—a nugget for the memory, as it were.

But all of these speculations fall short of reality: perhaps, in the end—a third hypothesis—a series of elaborate experiments proved that the rightful form for a breakwater, the most appropriate, the most effective, its absolute form, is the rhombicuboctahedron. What a sublime trick of chance that would be! Waves, those eternal rollers, picking off their victims, would break ideally upon a polyhedron that is the symbol of melancholy, uniting in a flash the wave [*vague*] of the ocean with the wave [*vague*] of the soul; the two models found by Zarka were rejected as faulty and abandoned in the wasteland [*terrain vague*, waveland] of a land where they now rest (these *vagues* do not share the same etymological root, but rhyme is not reason).

Photography, as the instrument for the collection of images, has—very broadly speaking—two principle functions. The first is to capture



Figure 2. 3D models of breakwaters: Accropode, Solis, and Trican.

Quatre types de brises-lames :
Core-lan, Accropode, Solis,
et Trican.
Four types of breakwaters: Core-
lan, Accropode, Solis and Tri-

that *decisive instant* which Cartier-Bresson spoke of—the product of the intelligence of the machine when conjugated with that of the photographer. The second is to frame those spaces where life appears to imitate art, to evoke the memory of painting, to fix the images of those places where the paucity of the world precipitates coincidences, giving rise to all kinds of reveries and hypotheses. This function, which depends more on the photographer than it does on the machine, easily accommodates the close or distant presence



Image publicitaire pour l'Accrochage de la
exposition "Sagadah"
Adressé aux visiteurs de l'Accrochage. Sagadah Group

of text: I'm thinking here, again, of Smithson. Raphaël Zarka sets out on a photographic trail of found sculptures, a trail which has produced, among other images, the *Forms of Rest*, as well as a series of unclassifiable investigations, undertaken on the frontier between sociology and literature, the most recent being *Une Journée sans vague* [*A Day Without Waves*] published in 2006 by F7 éditions¹; from the point of view of rhyme, and for reasons that will now be clear, I am particularly fond of the book's title. Here, in wonderful prose, Zarka recounts the history of what in France we call *skateboard*, but in Quebec, *rouli-roulant*, which, as everyone knows, consists in hurtling down slopes on little planks of wood furnished with wheels: according to legend, these objects were first dreamt up by a melancholy Hawaiian surfer *on a day without waves*—perhaps they had already broken on a giant rhombicuboctahedron.

It's a small world!

¹ Raphaël Zarka, *Une Journée sans vague*.
Chronologie lacessière du skateboard.
1778-2003. Éditions F7, Paris, 2006.

REPLICATION. EXE

NATHALIE LELEU

Nathalie Leleu is associate
curator at the Musée national
d'art moderne, Centre
Georges Pompidou, Paris.

Certain genes are destined for wonderful things: DNA's capacity to continually reproduce itself in the same, identical form constitutes an exceptional performance. Like a zip unzipping itself, a molecule of DNA self-divides, releasing two complementary strands which go on to synthesize their missing halves. Each new element thus resembles its initial model. This operation, called replication, is a recurring and endlessly rebooted programme at the heart of the production of any organism. The identity of that organism, however, is not determined by the event of replication alone; it also depends on the combination of countless other genes as well as how it might interact with its environment. Nevertheless, it is still the case that every birth results from a chemical operation: an operation that consists in making something new out of the old by means of a process which admits no posterity without filiations, no evolution without permanence, no autonomy without connection.

What occurs in nature, culture can reproduce: thus, to consider the artistic odyssey of forms as a mechanics of aesthetic replication—or possibly something more—is as tempting as it is thought-provoking for anyone interested in the reconstruction of works of art. If the theory that artists and their works are engendered by their predecessors is to the art historian what empirical observation is to the physician or the biologist, then to apply it to the necessarily uncreative practice of reconstruction and its results sets off a number of hares. Let us imagine, for example, that these hares are racing across the uneven terrain of twentieth century artistic production and the institutions responsible for its collection. Let us then postulate that the relationship between a referent and its reconstruction is characterised by the mimetic repetition of a creative act resulting in a tangible form. Let us also take as our starting point the fact that a number of major works of the twentieth century have been remade by artists and/or art historians on the one hand¹, and on the other that these artefacts have ended up assuming the status of works of art thanks to the way they have been displayed in museum collections. A baroque mind might then be prompted to hypothesise that replication plays an active role in remaking, and might want to interrogate further the nature and the value of the “genetic inheritance” thus passed down.

When Richard Hamilton reconstructed Marcel Duchamp's *The Bride Stripped Bare by her Bachelors, Even*, 1915-1923 (held in the Tate, London since 1975), otherwise known as the *Large Glass*, he provided

1 See Nathalie Léves, “Mettre le regard sous le contrôle du toucher - Répliques, copies et reconstitutions au XX^e siècle: Les tentations de l'historien de l'art” in *Les Cahiers du Musée national d'art moderne*, 693, Centre Georges Pompidou, Paris, autumn 2003, p. 84-103.

a number of illuminating answers to our question. In 1965, The British artist undertook the production of a new version of the work, which had been damaged while on display in Brooklyn in 1926², so that it might be included in an exhibition of what was almost an anthology of Duchamp's work that he was organising at the London's Tate Gallery in 1966³. The discovery of an edition of the *Green Box* in Roland Penrose's library at the end of 1947 prompted Hamilton to produce the first typographical version of Duchamp's notes for the *Large Glass* (1960). Hamilton carried out a very detailed semantic and technical analysis of those notes⁴, and came to the conclusion that they contained the matrix of the work. The *Large Glass* already existed physically; Hamilton had the opportunity to see it in the Museum of Philadelphia. Yet how he went about reconstructing the work deprives the physical replica of the original object of its relevance, as he himself explains in an interview published in *Art and Artists*: "The trouble is you can't make a direct copy of the thing—you can't go to Philadelphia, set up a piece of glass beside the *Large Glass* and work on it for a year. You have to find some other way of arriving at the end result. The approach I have taken—the long tedious approach—is to start from the beginning and cover the same ground that Duchamp covered, and what I did was to make a full-size perspective drawing from the given dimensions in the plan and elevation and other *Green Box* notes for the lower part of the *Glass* (it is in two sections) and hoped to arrive at something like a drawing which once existed on the plaster wall of his studio in Paris, but which has since been destroyed.⁵" Elsewhere, Hamilton makes clear that "his" *Large Glass* is not a reconstitution in the usual sense of the term but "the replication of the process of construction"⁶. Hamilton abstracted a perfectly "straightforward" geometrical system from the *Green Box*:



Richard Hamilton travaillant à un dessin de la *Boyenneuse de Chevalier*, 1965. Photographie: Mark Lancaster
Richard Hamilton working on the drawing for the *Boyenneuse de Chevalier*, 1965. Photograph: Mark Lancaster

2 *An International Exhibition of Modern Art Assembled by the Société Anonyme*, Brooklyn Museum, New York, from November 19, 1926 to January 1, 1927

3 *The Almost Complete Works of Marcel Duchamp*, Tate Gallery, London, from June 18, to July 31, 1966

4 Richard Hamilton was assisted in this by George Heard Hamilton, Professor of Art History at Yale University.

5 "Son of the Bride Stripped Bare". Interview of Richard Hamilton in *Art and Artists*, Bannan Books, London, vol.1, n°4, July 1966, p. 22-23

6 "The reconstruction of Duchamp's *Large Glass*, Richard Hamilton in conversation with Jonathan Watkins" in *Art Monthly*, Art Publications Ltd., London, may 1990, n°136, p.5

"The dimensional system of the glass is perfectly straight forward. Unusual in being very precise. [...] Given that information, it is possible to make a perspective from it; as Duchamp did.⁷" If what Hamilton describes as his "intimate" knowledge of the *Green Box* authorises his decoding and evaluation of Duchamp's creative system, it is also a symptom of his ambition to arrive at a functional restitution of that system in the shape of the work it is supposed to have engendered. The Swedish art historian Ulf Linde made the first replica of *Large Glass* in 1961⁸ and the last in 1992⁹; over the years, he also toyed with the idea of undertaking a related project: to unlock the perspectivist mysteries¹⁰ with the key provided by the *Bride*, and thus to bring an end to that suspense carefully cultivated by Duchamp, who declared to Pierre Cabane in 1966: "the *Large Glass* constituted a rehabilitation of the perspective that had been completely ignored, disparaged. In my work, perspective had become absolutely scientific."¹¹

The process of reconstruction undertaken by Hamilton is not disinterested; how he set about deducing an artefact from Duchamp's formula is bound up with his own creativity. "My efforts have always been directed at producing an object which has its own integrity, which is not really a copy in the sense that it's a thing which has no life of its own."¹² The materiality of Richard Hamilton's work results from a mode of production for which he is responsible and which has its own justification—and this is not disqualified by the signature that Marcel Duchamp appended to the London-based replica of the *Large Glass*. This certification is a sign of acknowledgement of the work's "genetic code"—a code transmitted by means of a form which it helped to determine but fell short of crystallizing. Hamilton noted that the counterpart of the geometrical speculation inspired by the *Green Box* was: "A psychological mystery which is the imagination of an artist coming to grips with a subject."¹³ He certainly hoped that the psychic ferment which he had recognised and which constitutes



Son of the bride stripped bare (Tlx 96 la mortis vires & m.). Montage graphique parti: la la kulla verba publika dano and Artist: 1966.
Son of the bride stripped bare, montage published in *Art and Artists*, 1966.

⁷ *Art and Artists*, p. 23.

⁸ At the occasion of the exhibition *Bewogen beweging* curated by Pontus Hulten at the Stedelijk Museum in Amsterdam and at the Moderna Museet in Stockholm, both in 1961.

⁹ For the exhibition *Territorium Artis* curated by Pontus Hulten at the Kunst- und Ausstellungshalle, Bonn, 1992.

¹⁰ Ulf Linde, "Perspective: la perspective dans les neuf moules maliques" in *Marcel Duchamp. J. Abécédair, approche critique*, Centre Georges Pompidou, Paris, 1977, p. 160-165.

¹¹ *Marcel Duchamp / Entretiens avec Pierre Cabane*, Somogy, Paris, 1995, p. 47.

¹² *Art and Artists*, *ibid.*, p. 25.

¹³ *Art and Artists*, *ibid.*, p. 24.

the true heritage of the *Bride* would live on in the London model—a heredity sought after and desired *a fortiori* by an artist. Nevertheless, Hamilton claimed that he did not expect “his” *Large Glass* to be “treated” by the Tate Gallery ‘in the way it is—with my name on it besides Duchamp’s’, although he went on to add that, for the Tate to do so, would be “to some extent legitimate.”¹⁴

Hamilton seems to have sought a constructive response in the *Large Glass*, which he studied as if it were a mathematical object. Countering the object of contemplation, the work is a zone of activity which reveals itself to a kind of thinking interested in process and which constantly engages with the work so as to uncover the potentialities it harbours. Thus, according to Hamilton, the differences in perspective which he detected between the Philadelphia *Large Glass* and his own version “were happening as result of following out the principles set down by him”¹⁵ (Duchamp). Citing differences in materials and equipment used, but also invoking the corrections that Duchamp made to his *Green Box* notes after the fact, Hamilton located the systemic failings of the *Large Glass* in the catalyst activated by the process of reconstruction and its third-party maker.

The intelligible matter supplied by geometrical figures has fed the ‘psychological mystery’ that founds artistic creation over centuries, and which is passed down from work to work. The attributes that Plato gave to the solids in the *Timaeus* (the cube—earth; the octahedron—air; the icosahedron—water; the tetrahedron—fire) have enjoyed a rich symbolic posterity. A famous polyhedron figures in Albrecht Dürer’s *Melancholia I* (1514) but also in Alberto Giacometti’s *Cube* (1933) and *Tête-Crâne* (1934–36). Elemental shapes that are by no means at rest: in the early years of the twentieth century, Casimir Malevich accorded the square the absolute value of Suprematism which, as Jean-Hubert Martin remarks, was “developed by dividing the square, using the two rectangles thus produced to make a cross, and rotating the square to make a circle.”¹⁶ From Malevich’s investigations came his *Architectones*, which were an attempt to explore suprematist space in three-dimensions, and which led him to give up painting for a decade. His constructions—which synthesize sculpture, architecture and urbanism—disappeared after being exhibited in the USSR in 1932.

14 *Art Monthly*, *ibid.*, p.3

15 *Art and Artists*, *ibid.*, p.25

16 Jean-Hubert Martin, “Casimir Malevitch: fonder une ère nouvelle” in Malevitch, Centre Georges Pompidou, Paris, 1978, p.14–15

When Troels Andersen, a Professor at the University of Aarhus in Denmark, began to look into Malevich's œuvre after the war, there was not much left to look at. The only works of Malevich's known in the Western world were the five paintings that made it to the MoMA. Then, in 1958, more than twenty years after Malevich's death, the important collection of works that he entrusted to Hugo Häring at the time of his hurried departure to the USSR in 1927, turned up at the Stedelijk Museum in Amsterdam. Andersen set about gathering together the diverse photographic and written documentation of Malevich's artistic production in general, and the *Architectones* in particular, as well as a large number of statements that he published in Amsterdam in 1970¹². An article by Malevich which appeared in the *Wasmuths Montashefte für Architektur* and an album of photographs put together by Wladyslaw Strzeminski, the Polish painter, at the time of his collaboration with Malevich in the Ouwonis studios in Vitebsk in the twenties, constituted the only available information on the *Architectones*. In 1975, Andersen struck upon the idea of reconstructing, with the help of his students, the simplest model *Gota 2A* on the basis of a photograph published in *Der Sturm*, the mathematical calculations of the form and the types of materials described by Malevich. Poul Pedersen, Andersen's most talented student, perfected the principle of reconstructing. Then, in 1978, two models were exhibited as part of the Malevich centenary show at the CNAC-GP, and a vast number of texts were published on the subject (which have since fed work on the architectural theories that linked Suprematism to Neoplasticism). At around the same time, five packages were delivered to the Centre Pompidou, stamp-marked USSR—the results of the research undertaken by Pontus Hulten, then the director of MNAM, and Jean-Hubert Martin, the curator of the *Malevich* show. The packages contained the remains of the original *Architectones*—and Poul Pedersen would set about reassembling them and reconstructing some of their missing pieces.



Poul Pedersen travaillant à la reconstruction d'un Architectone dans les ateliers du MNAM, 1978. Photographie: Jacques Faugnot
Poul Pedersen working on the reconstruction of an Architectone at the National Museum of Modern Art (Centre Pompidou) in Paris, 1978. Photograph: Jacques Faugnot

12 See Troels Andersen, *Malevich: Catalogue raisonné of the Berlin exhibition 1927. Including the collection in the Stedelijk Museum Amsterdam*, Stedelijk Museum, Amsterdam, 1970, p.138-144.

From the very first attempts to the final apotheosis, the enterprise was never straightforward. Andersen and Pederson had initially adopted a rigorous method: they would analyse photographs so as to calculate and transpose the proportions. But the model which emerged from this theoretical speculation was hardly satisfactory, as the pictures of the model taken from the same angle as that in the documentary photographs show. So Pedersen then approached the problem from the other direction, anchoring his research in Malevich's pictorial system: his study for *Black and Red Square* (1915) and *White Square on a White Background* (1918) convinced him that the oblong shapes of the *Architectones* were based in the spatial development of the square. After a number of attempts, the formal space of the work was reconciled with its physical space—as the elements salvaged from forty years of clandestine work and delivered in shoe-boxes would prove, although that proof brought with it its own set of difficulties. For Poul Pedersen, remaking the *Architectones* was his true calling; because the “cosmic flame” that was supposed to spark from the “point zero” of the shape reduced to a square (in Malevich's own words), could not be reconciled with the project of reformulating of a geometrical system, he had to integrate a subjective co-efficient with which had a certain affinity: “When Malevich painted his black square, he was meditating; when he painted a painting with a number of different elements, he was constructing; and when he introduced different elements into his Suprematist works, the determining factor was his intuition.¹⁸” Whatever traps it lays, this irreducibility of the phenomenon of creativity participates in the process of reconstruction; rather than skirting this, Poul Pedersen entered into an exchange with the *genius loci* of the *Architectones* and welcomed the filiations between Malevich's gesture and his own work: “In my analysis, I will overlook those tiny irregularities which are always present in Malevich's elements and, as a consequence, also in the two squares which figure in *Black and Red Squares*. This is because, in every painting, there will be something that escapes analysis. I call that something the place where poetry can be expressed. In my view, these tiny irregularities



Françoise Schuiten et Benoît Peeters. *Le Fibre d'Orbivante*. Castelnau, 1983, p. 60.

18 Poul Pedersen, “Le carré comme point de départ” in *est. Malevitch - architectones, peintures, dessins*, Centre Georges Pompidou, Paris, 1980, p. 30.

were produced with the same intuition as those thick horizontal and vertical lines in Mondrian's paintings.¹⁹

"Psychological mystery" and "intuition"—the canonical forms projected in space are accorded the same properties as those which esoteric doctrine attributes to a magic circle: energy, transgressiveness, and fecundity, characteristics which whoever traces the outline or penetrates the circle is endowed with. In *La Fièvre d'Urbicande*²⁰, François Schuiten and Benoît Peeters invent metaphorical footbridges, starting with the cubic structure which invades the Continent of the Dark World, the background to their sequence of graphic novels. The square inheres in space like a network overlaying the architecture of cities, reorganizing the routes taken by their inhabitants, how they interact with one another. Its formulation as an equation, attempted by the "Urbatec" Eugène Robik, architect and city-planner of Urbicande, does not penetrate the mystery of this irresistible replication; preoccupied by the mechanism it sets in motion, he overlooks its essence. "Wherever form lacks content, it is empty and dead."²¹

In his *Journal* published in 1930, Johannes Itten indirectly discloses what is no doubt the secret of successful artistic replication.

SPHERES AND TRACKS

SOFIA TALAS

Sofia Talas is curator of the
Museum of the History of
Physics, University of Padua.

“... I discorsi nostri hanno a essere intorno al mondo sensibile, e non sopra un mondo di carta¹”, wrote Galileo in 1632. He thus refused, as he had done a number of times before, to limit himself to abstract knowledge taken from books and reaffirmed his ambition to study what he called “il libro della natura”. This attitude, which recalls Andreas Vesalius’s work in the field of medicine in the sixteenth century, was one of the keystones of the revolution that would shake the foundations of seventeenth century: a modern experimental method was emerging, based on experimentation and observation. The method would be adopted over the course of the period appropriately known as the “Scientific Revolution”. At the heart of all this change, Galileo’s decision to point a telescope at the sky so as to make scientific observations was particularly significant: he had transformed a simple optical device into a scientific instrument that could contribute to our understanding of the world. From that point on, artefacts began to play a crucial role in the study of knowledge. In this article, I will examine a number of these particular devices, all of which involve balls rolling down differently shaped tracks. Galileo used some of these apparatus in his studies of movement; they were then extensively used in physics lessons throughout the eighteenth century.

Galileo taught mathematics at the University of Pisa before settling in Padua in 1592, where he became a Professor of Mathematics. At that point, he was well-known within a small circle of specialists working in the field of geometry; by the time he left for Florence eighteen years later, he had become famous throughout Europe. He carried out some remarkable studies in that period, which he would continue to work on and develop over the following years. Galileo was a firm believer in the Copernican system, and set out to prove the theory by working in the fields of both astronomy and mechanics. The studies he carried out in the latter domain—especially his work on falling bodies and projectile motion—marked the birth of modern mechanics; his findings would directly oppose the Aristotelian conception of movement that had been dominant up until that point.

According to Aristotle, “light” bodies (like fire, for example) rise, while “heavy” bodies are naturally bound to fall in the direction of the centre of the earth. It was thought that once a heavy object is dropped, in an infinitesimal stretch of time, it goes from travelling at no speed at

all to a given speed that is then maintained for the length of the fall. That speed was thought to depend on the resistance that the falling object encounters as it falls through space. It was considered to be proportional to the weight of the object itself. The idea of acceleration was unheard of. At the time there evidently were no available means to measure or to study the speed of a vertical fall. Yet, from his work on pendulums, Galileo found a way of solving the problem. He discovered that the speed acquired by an object depends only on the height from which it is dropped and not from the fall itself. Thus, rather than studying a vertical free fall, he could work by dropping balls down inclined planes. In order to divide time into equal intervals, Galileo drew on his skills as a musician; to measure the time a ball took to travel across different lengths, he used an extremely precise water clock. Thus, at the very beginning of the seventeenth century, he showed that a body accelerates as it falls and formulated the mathematical law of free fall: the space travelled by a body is proportional to the square of the fall time. In other words, over equal intervals of time, an object in free fall travels ever-greater distances following the sequence of odd numbers². We should make it clear that, at the time, people only used the concept of average speed—it is to Galileo that we owe the concept of “instantaneous speed”, which is the speed acquired by an object each second of its trajectory.

But Galileo went further. He was very interested in the problem of ballistics—which were much discussed at a time when being able to determine the trajectory of a cannonball with a degree of precision was of central importance—and started working on the problem of the movement of projectiles. According to the Aristotelians, this involved distinguishing between so-called “natural” movements, in keeping with the nature of objects, and “violent” movements caused by an “artificial” action exterior to the nature of the objects themselves. “Violent” movements—firing an arrow or throwing a stone for example—come to a stop when the “artificial” action which caused them ceases. It was thought that the trajectory of missiles divided into two distinct phases: the projectile initially moves as a result of the exterior action acted upon it; once this movement comes to a stop, it then falls “naturally”—that is, straight to the ground. The two phases were distinguished from one another by a kind of state of rest between the two types of movement, considered to be completely independent from one another.

Galileo radically modified these ideas, coming to the conclusion that the trajectory of a projectile was a parabola resulting from the combination of a horizontal movement at a constant speed and a vertical movement that was accelerated due to gravitation. For centuries, historians believed that this conclusion was the result of pure reasoning on Galileo's part. Then, at the end of the 1970s, Stillman Drake, a Canadian historian of science, made a striking discovery. He analysed a number of manuscripts that Galileo was careful to keep with him at all times. These documents contained schemas, calculations and handwritten notes. Drake suggested that these constituted the results of real experiments that Galileo had carried out himself, and reconstructed the device that he appeared to have used. It was a track shaped in a quarter-circle (or an inclined planed finishing with an arc of circle), the end of which is at a certain height from the ground. Balls are dropped, and roll the length of the track and shout out in a horizontal direction. The horizontal velocity of the balls depends on the height of the point they started from. The trajectory of the fall is parabolic. Drake carried out a number of trials with this instrument, and demonstrated that Galileo had carried out his experiments and made his calculations with starting points of the balls set at different heights. In this way, he proved that the Tuscan scientist had indeed studied—experimentally, and in detail—the parabolic trajectory of projectiles, and was already doing so at the beginning of the seventeenth century³.



Réplique de l'appareil à double canal en forme de demi cercle utilisé par Galilée pour étudier l'isochronisme des pendules. Musée d'Histoire de la Physique, Université de Padoue. (Cet appareil a été construit à Padoue sous la direction de S. Settle en 1994.) Photographies: S. Settle, 2004. Reconstruction of the apparatus used by Galileo to examine the isochronism of pendulums, Museum of History of Physics, University of Padua. The reconstruction was made in Padua by Thomas J. Settle in 1994. Photograph: S. Settle, 2004.

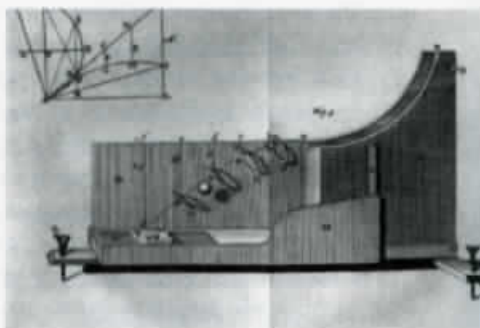
Galileo also used instruments of this kind in the context of other studies, and in particular to examine the movement of pendulums. He sought for example to find out whether—and under what conditions—the duration of a pendulum's swing depended on how far it swung. With this goal in mind he measured how long a hundred swings of a pendulum took to swing different distances. He almost always obtained

the same result. He had a device constructed with two parallel tracks in the form of half-circles. The two channels were hollowed out of the upper edge of an upright wooden plank. Galileo dropped a ball down each canal, but from different heights. Due to friction, how far they rolled up the other side of the half-circle quickly reduced, and he observed that, regardless of their initial position, the two balls rolled back and forth in time with one another. Galileo was convinced from his experiments that the duration of the swing of a pendulum was independent of how far it swung: thus, in his view, pendulums must be isochronous. The study of the problem of isochronal pendulums would in fact preoccupy the scientists for many years to come.

It is interesting to note that the new experimental method, which initially emerged in the field of research, slowly transformed the way in which physics was taught. In effect, at the close of the seventeenth century, in England—where the works of Isaac Newton, which underscored the experimental character of physics, had had a major impact—lecture-demonstrations were offered: physics lessons illustrated by a great many experiments. Willems 's Gravesande, who became a great defender of Newtonism after a stay in England, introduced this new way of teaching physics into Holland. Scientific instruments were used in the classroom so as to provide a direct and immediate demonstration of physical laws in the various subject areas studied at the time. As 's Gravesande put it in a letter to Newton in 1718, the instruments themselves "conveyed the force of the theorems". The new lessons were spectacular, and quickly caught on in France before spreading all over Europe. Hence the proliferation of "Physics Cabinets"—private collections of scientific instruments intended for research and teaching; many universities created Chairs in "Experimental Physics". Physics was enjoying an unprecedented popularity, and met with enthusiasm in the salons and the royal courts. Voltaire, for instance, was an ardent admirer of Newton, created his own collection of scientific instruments and used them in a number of experiments.

As for mechanics, a diverse range of new instruments was updated so as to provide a simple demonstration of the new laws of movement that Galileo had introduced. In 1699, the Carmelite Sébastien Truchet, a famous inventor (a number of illustrious characters visited his workshop, including Peter the Great) and honorary member of the Royal

Academy of Sciences in Paris, presented "a machine made to demonstrate the role played by proportion in the movement of falling objects". His instrument was made out of curved metal bars forming a paraboloid. A pair of brass wire is wound in a spiral around the paraboloid. The loops of the spiral gradually increased in circumference as they got nearer the ground, and lengthened following the sequence of odd numbers. Due to acceleration, the time it took for a ball dropped at the top to travel round each loop of the spiral remained constant—a simple and effective way of demonstrating Galileo's law of falling bodies. Later, in 1720, 's Gravesande reworked an instrument intended for the study of the movement of projectiles: perfected in 1742, it became a classic item in the Physics Cabinets of the eighteenth century. The instrument was a semi-circular track hollowed out of the upper part of a vertical board of wood. Next to it was a second board, to which rings had been attached at intervals along the length of a parabola. Evidently, a ball dropped from the top of the track was shooting out with a horizontal velocity and dropped through all the rings, which showed that its trajectory was parabolic.



Instrument pour la démonstration de la trajectoire parabolique des projectiles Guillaume Jacob 's Gravesande, *Physicae Elementa Mathematica, experimentis confirmata*, Leyde, 1742. Musée d'Histoire de la Physique, Université de Padoue. Apparatus for showing the parabolic trajectory of bodies. Guillaume Jacob 's Gravesande, *Physicae Elementa Mathematica, experimentis confirmata*, Leyde, 1742. Museum of the History of Physics, University of Padua.

Other apparatus were used to study and to demonstrate the law of pendulums. One of these devices, invented by 's Gravesande in 1725, was a wooden structure with two parallel tracks reproducing the curves of two identical cycloids, each ending in a straight track. Two balls dropped from different heights would always reach the horizontal part of the canal at the same time. This property of the cycloid—called "tautochronism"—was discovered by Christiaan Huyghens in the 1650s, and Huyghens had used it to perfect the workings of pendulums. Thanks to Galileo's contributions to the field, the study of pendulums had continued throughout the seventeenth century—in particular, much work had been done on how to construct isochronal pendulums. Huyghens noted that a pendulum which swung in a cycloid motion was naturally isochronous and in 1659 he perfected a

cycloidal pendulum. This was used by watchmakers for many years, hence the popularity of the instrument described above in the Physics Cabinets of the time.

Balls rolling down differently shaped tracks: these are the apparatus which enabled Galileo to revolutionise the science of movement at the dawn of the Scientific Revolution. We have seen that variations on these instruments continued to be developed and used throughout the eighteenth century—straight, semicircular or cycloid tracks—so as to offer striking proof of the laws of motion. Slowly, however, new instruments started to appear. Conceived in a completely different way, the new instruments enabled scientists to obtain far more accurate results. The balls and the tracks were abandoned, but not before having had a profound influence on the development of modern science. They had played a crucial role in building a bridge between two worlds: the “*mondo sensibile*”, that of observable and measurable phenomena, and the world of abstract knowledge taken from books, the “*mondo di carta*”.

**COMPACT
AND POROUS:
A CONVERSA-
TION WITH
RAPHAËL
ZARKA**

FRANÇOIS PIRON

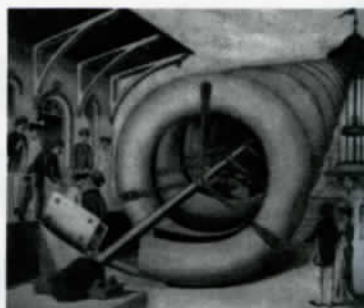
François Piron is a curator
and an art critic. He
teaches art history at the
École nationale des beaux-
arts in Lyon. He co-runs the
Castillo/Corrales gallery in
Paris.

RAPHAËL ZARKA We tend to visualise time in the form of a circle or a straight line. Personally, I see it as something between the two: a kind of spring, or an endless screw. Something which moves forward but, at the same time, loops round. The loop is the image of all historical constants; in the same movement, the spiral produces an evolution. Two types of constant would seem fit into this schema: on the one hand, ideas which stay the same but which take on different forms at different times; on the other, forms which remain constant but which differ totally in content.

FRANÇOIS PIRON Modern thought tends to conceive of traditional, pre-modern time as cyclical, and to think of modern time as a kind of projection, a permanent progression, a straight line. I think we're both more interested in "temporal knots"—those figures, forms, phenomena which make for historical entanglements, internal contradictions, which don't allow for this polarity between progress and repetition, this opposition between the projection toward the future and looking back to the past. In this light, the very idea of post-modernity seems to me to be problematic; as Jacques Rancière argues, it results from a reductive and erroneous reading of modernity. The notion of post modern hybridity rests on a concept of modernity as a straight line.

A key notion for your thinking and practice is what Roger Caillois calls a "generalised poetics" which, as he puts it, presupposes a unity and continuity between the physical, intellectual and imaginary worlds. In other words, a kind of syncretism which allows for the possibility of a generalised theory, and potentially even an exhaustive taxonomy, of the forms produced by nature and by man within a finite world... You're interested in cultural phenomena, in forms produced by other artists, in forms which are necessarily temporal, even "temporary". What are your thoughts on the question of the context of these forms?

RAPHAËL ZARKA It is my feeling that the context is never primordial. This is perhaps my natural tendency toward abstraction, I tend to think about things as if they'd come straight out of a dictionary or a book...

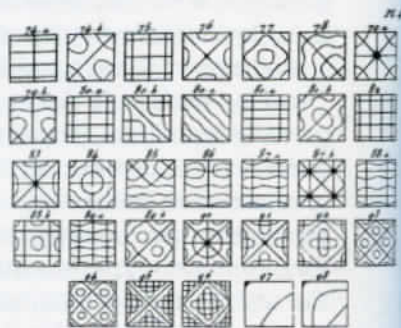


Voyageurs à l'intérieur d'une vis d'Archimède, *Scientific American*, vol XCI, n°26, 24 décembre 1904.

Riders inside of an Archimedes screw, *Scientific American*, vol XCI, n°26, december 24, 1904.

Yet what interests me is to see how certain, very particular forms, are situated in different contexts. When I say context, this can mean a spatial as well as a temporal context. For example, the form which I consider to be fundamental to my work is the concrete breakwater which I photographed near in Sète in 2001—the first image in the *Forms of Rest* series. I can't remember whether I thought that at the time, but what fascinates me about these objects is the fact that they should reappear there, on the edge of the road on the way to Sète, in one of the most unforgiving materials there is—a form straight out of Antiquity and Plato's meditation on ideal forms. I find that incredible. A few years later, someone told me that the same form figured in a treatise by Luca Pacioli on Divine Proportion. While doing some research on the mathematician, I came across the only known portrait we have of him. And I noticed that in the portrait, suspended in the air next to him, there's glass form, half-filled with water... the same form, exactly the same, a rhombicuboctahedron. This question of a straight line or a loop often comes down to a question of memory... If you have a good memory or you look hard enough you cannot help but notice those historical entanglements you were talking about.

In *Récurrences dérobées*, Caillois compares the shapes of Chladni's experience (he discovered that when you rub a bow on the side of a copper plate covered with sand, it arranges according to geometrical patterns) with the drawings that can be found on certain stones, and makes an analogy with the Pied Piper of Hamelin, whose flute lured all the children to the mountain. In this way, Caillois creates a completely speculative montage, the idea being to demonstrate that vibrations and resonances, like those of the flute, produced the geometrical forms in the rock. From a scientific point of view, this doesn't stand up at all, but his argument is very beautiful—and there are recurrences which link man-made objects with those found in nature.



Ernst Florens Friedrich Chladni. *Traité d'acoustique*. Courcier, Paris, 1809. planche 4.
Ernst Florens Friedrich Chladni. *Traité d'acoustique*. Courcier, Paris, 1809. plate 4.

FRANÇOIS PIRON Some of your works, notably the sculptures, repeat works by other artists: I'm beginning to wonder how, following

on from this idea, you conceive of them? Do you think of them as "natural"?

RAPHAËL ZARKA Yes, that's really perceptive. Let's say that most of the time I work in a documentary mode. Yet the subjects that I'm drawn to are not disconnected from me. It's almost as if my imagination had been dismantled and projected into certain forms which I then discover outside of myself. In this sense, for me a work of art is not any different to a breakwater or a rock—it's just one object in the world among others.

I consider myself as much a collector as an artist, or as an artist inasmuch as I'm a collector. Which is why I'm interested in cabinets of curiosities—in the mode of collecting that the cabinet suggests, making no distinction between artefacts and natural objects: a narwhal tusk, a mandrake root, sit next to little polyhedrons made out of ivory.

In my work there is on the one hand the photographs, and on the other the sculptures, which are more often than not replicas or cover versions, as for example the breeze-blocks wheel which was originally a work by a Brazilian artist, Iran do Espirito Santo. Some might think that I work in the same way as artists interested in appropriation. The difference is that, for them, the original work has to already be a well-known masterpiece, in order for the spectator to understand that this is an appropriation or copy. The artists of that generation make appropriation into a subject; for me, though, it's a method, something integral to the work, which, at the end of the day, is not problematic at all.

FRANÇOIS PIRON The idea of appropriation is essentially a comment on the social value of the work. Your mode of working is also different from a citational practice: so many artists today exploit the practice of artistic citation, and can't look at a burnt-out car without thinking of Chamberlain or Cesar—which is in the end a pretty narrow way of looking at the world. When you photograph your industrial ruins, you don't make a hierarchical distinction between the context of these forms and the cultural analogies that you project onto them. These are forms in the present tense, but which are, let's say, haunted, or weighed down by historical and cultural links.

RAPHAËL ZARKA No, you're right. It's important to me that the photographs are images and not simply documents. Perhaps there's something here

of the order of the difference between the citation and the hypertext. The hypertext reinjects meaning into works from the past.

I did that first cover version of *Espirito Santo* in 2002, and since then I have only done one more—a piece by Michael Heizer in 2006. Meanwhile, I got interested in the *Cretto*, the monumental sculpture by Alberto Burri in Sicily, and in the public works of art that skateboarders use to do tricks on. In the same period, I moved from repetition to replication, they are of course closely linked. The first replica I made was of the two rhomicuboctahedrons from *The Forms of Rest #1*; I didn't want to replicate those objects as they are in real-life, but to replicate the photographed objects, which meant making some formal changes. I also replaced concrete with rafters; I wanted to stay very close to the aesthetics of the site, but without it being mimetic. At the moment I'm working on sculptures in boxing plywood and Carrara marble. This time the montage is more complex, the ensemble brings together replicas of photographed objects, of scientific objects (more specifically the objects which Galileo used in his studies of movement) and "deduced" sculptures: the negative form of an object, for example, or the form which results from assembling a given module. You see how this is quite far from the appropriationists. The only thing which really interests me in their work is how they manage to make a unique work of art ubiquitous. That's something which fascinates me, which is one of the reasons why I'm fascinated by the replicas of the *Large Glass*.

FRANÇOIS PIRON Especially as the *Large Glass* is a priori unreproducible, due to the empiricism of some of the techniques that Duchamp used. It meant inventing new methods for reconstruction, which is what's really interesting.

RAPHAËL ZARKA Absolutely, and that matters to me too. You know the story of the work by Michael Heizer that I covered. It was first made by Gilles A. Tiberghien, an art historian. Heizer didn't do anything, which reminds me of a documentary made at the time of *When attitudes become form*. In it, Heizer was asked why he wasn't digging a hole himself, and he replied: "because I don't like working"—I like that a lot. So it was Tiberghien who got on with engraving the tarmac, in Saint-Germain, in front of the La Hune bookshop: five little circles. He was replicating a work that Heizer had made in the desert, at the end of the 1960s, I think.

When I was a student, you could still see Heizer's circles. But since then they've redone the pavement and the work has disappeared. All that's left is trial run behind the newspaper stand. When last year Bernard Guégan asked me to participate in the Galerie Extérieure (a series of impromptu exhibitions in public spaces), I thought that it would be a good opportunity to make this reprise that I'd already been thinking about. Bernard had selected the area around the Rue du Faubourg Saint-Denis in Paris; so, first of all, I looked to see if I could find a circle engraved in the ground (and once you start looking, you find them everywhere—it so happens that the most common ones are twelve centimetres in diameter, the same as Heizer's biggest circles). Once I'd found one, I engraved four others in relation to it. I liked the fact that this cover version was delocalised—both spatially and temporally. And that the work reappeared in a place where it was already, almost visible, though involuntarily.



Premier essai d'empreintes pour Circular Surface Planar Displacement Steel Die de Michael Heizer réalisé le 7 décembre 1993 au 170 boulevard Saint-Germain à Paris, derrière le kiosque à journaux. First try for the engraving of Michael Heizer's Circular Surface Planar Displacement Steel Die made on the 7th of december 1993, 170 boulevard Saint-Germain in Paris.

FRANÇOIS PIRON So you bring this notion of context back in...

RAPHAËL ZARKA Yes, sure... though for me it was really just a means to avoid spending days and days wondering where I should do the piece! I find that kind of question exhausting, you know? Making work on the Rue du Faubourg Saint-Denis doesn't interest me at all! What interests me is to work at home, to investigate the connections that forge themselves between my different pieces. Other artists work project by project—with each project being a kind of island, unconnected. But I work through montage. After all, a collection is a kind of collage in time. I can have two, completely unconnected things in my head—they prompt me to come up with another idea that could make a connection between those two things. That's how I get pleasure out of conceiving objects. And it's that which makes me want to keep making photographs, drawings, objects, or videos...

FRANÇOIS PIRON So you have an open space, and you can keep adding new instances? Are there more *Forms of Rest* to come?

RAPHAËL ZARKA Yes, it's open. But, at the same time, the more subjects I find, the more my work opens out onto different terrains. I also take the time to look back over my work—I tend to look at it as if someone else had made it, which is true in a way. For example, in the *Forms of Rest* series, I hadn't noticed that I'd photographed two families of shapes—curves and geometrical forms. Maybe I saw this because of skateboarding, as the two main terrains that skateboarders use are, precisely, the curve and the orthogonal. With each new piece that I add to the puzzle, I get ideas for other things that I can add to my work. I seem to get more productive with each year, because the number of potential "takes" that I have on the world increases.

FRANÇOIS PIRON I get the feeling that through these found forms you're looking, a bit haphazardly, for a kind of primitive vocabulary: you're classifying archetypes. A universe of finite forms is possible only if the elements are "categorised".

In the same way, if you separate mythological narratives from anecdote and retain only the schema, then you find that the number of possible stories is extremely limited. This is certainly a way of identifying the particularly human motifs, beyond cultural, temporal and civilisational differences. But does this logic of a finite ensemble of forms and ideas leave any room for the possibility of rupture, a break?

RAPHAËL ZARKA The two figures of modernity, or at least from the beginning of the century, which are most important to me are Kurt Schwitters and Duchamp. The German Dadaists thought Schwitters was too bourgeois, he always separated art from politics and, alongside his "modern" practice of making collages, he held onto his liking for oil painting. I like lots of his landscapes and portraits. As for Duchamp, the ready-made interest me only as means to mythologize an object. I like the tools he used—photography, text, replicas etc, which turn the ready-made into fictional characters. But the Duchamp which interests me the most is the artist who made the *Large Glass*, who broke with his time, who introduced perspective even though the avant-garde had declared it old-fashioned, passé. I like to think of Duchamp the librarian, buried deep in treatises on perspective, spending hours on his *Chocolate Grinder*, making sure that the drawing was perfect, industrial. In doing that, he broke with what was contemporary, and reused the tools of the past so as to stir up the present. He was so far ahead in his thinking about the very idea of rupture.

FRANÇOIS PIRON Yes, it seems that Picabia and Duchamp were very quick to see the tradition of rupture, or "rupture as tradition". And Duchamp introduced his notion of "lateness", using ideas or techniques from the past so as to go beyond the present. He was certainly very doubtful of the conventions of the modern. Duchamp is, once again, a kind of knot, or temporal tangle. I think that we can examine certain stages in the evolution of twentieth century art in terms of their interpretation of the work of Duchamp. The way in which Kosuth, for example, understands Duchamp has a lot to do with a relationship to the art scene, the manipulation of its conventions, the so-called renunciation of craft in artistic practice, whereas today, it's perhaps the opposite: it's the preciousness of his objects, the hermetic quality of his works that makes Duchamp contemporary.

RAPHAËL ZARKA For a lot of artists of my generation, the point of reference is Mondrian rather than Duchamp!

FRANÇOIS PIRON Ad Reinhardt said that "between Mondrian and Duchamp, you have to make a choice". It's definitely a dividing line. Henri-Pierre Roché insists on the fact that Duchamp's work resides in how he used his time. And in effect, it's fascinating to look at the speed he worked at, which goes from extremely fast to extremely slow, from extreme reactivity to refusing to take the world around him into account.

For many people, Duchamp is a man of the nineteenth century, with his boxes, his bibliophilia, his leather-bound books. A lot of artists from the 1950s and 60s didn't like Duchamp for that. The modernists had a problem with him, and considered him a kind of old-fashioned bourgeois.

RAPHAËL ZARKA I have a kind of sympathy for that kind of bourgeois eccentricity, which both Schwitters and Duchamp share. I'm sure it comes from my resistance to trends, and especially my distrust of things that are self-consciously rebellious. I have to admit, and I don't think it was a choice I made at the beginning, that I feel closer to this



Marcel Duchamp, *À regarder d'un œil de près pendant presque une heure*, 1918
Marcel Duchamp, *To be Looked at (from the Other Side of the Glass) with One Eye. Close to, Almost An Hour*, 1918

classical, precious way of thinking, to this distrust of the notion of the avant-garde. I prefer individuals to groups or movements.

At the École des Beaux-Arts in Paris, I had a hard time working out how I fitted in. It was the period of post-relational aesthetics, and I didn't feel that my work was contemporary at all. It was considered reactionary, or at best completely anachronistic. When I started getting into the history of skateboarding, which made a change from just being interested in Kepler or the pre-Socratics, and I got the feeling that that reassured them... But they're right to think that Kepler linked to skateboarding leads to something much more complex. Yet, for example, and this comes back to what we were saying earlier about citation, the word 'sampling' has never interested me. What can I say: I've always preferred the ideas of the "standard" or the "replica"—probably because they correspond better to my taste in music!

I'm interested in the artist as an essayist. To be an artist is, for me, to also take the time to do something else, to be a good reader, or a good spectator for example.

FRANÇOIS PIRON In your work as, for example, in Ryan Gander's, Aurélien Froment's, Isabelle Cornaro's, Jonah Freeman's or Corey McCorkle's, I find a real ability to combine cultural elements that don't fit together in terms of form, but which are, on the contrary, altogether heterogeneous (aesthetically, historically, culturally), difficult to link together.

RAPHAËL ZARKA And yet, when two elements seem totally heterogeneous, sometimes a third can establish a link between them. It seems to me that that's what those other artists are doing—whom, in effect, I feel a certain affinity with.

FRANÇOIS PIRON Maybe this ternary rhythm is the key. Sampling in pop music relates to the binary, to the principle of putting one beat on top of another, in the attempt to mix the one fluidly into the other. But Ryan Gander, for instance, always shows his pieces in sets of three,



Werner Herzog. 2002. *Modèle réduit*, matériaux divers 200x160x110cm. Collection Fonds National d'Art Contemporain, Paris (photo: Marc Damage).

Werner Herzog. *Model* (scale: 1/100) Dried vegetation, plaster, plastic, wood. 200x200x140cm. Collection Fonds national d'art contemporain.

and you speak of a triangular method of working, which produces a kind of non-linear progression. Is it about moving sideways, like a crab?

RAPHAËL ZARKA You have no choice! You only have to look at how they measured the Paris Meridian so as to establish the standard metre. You don't measure the earth in a straight line. It only works by triangulation—so to go forward, you have to go sideways. I can identify with that kind of *schéma*, as a way of thinking.

FRANÇOIS PIRON There are artists who favour formal associations, who seek a signature style, a kind of homogeneity to their work so that it can be more easily identifiable. In your work, we're not aware of there being so many limitations—you don't seem to be afraid of diversity.

RAPHAËL ZARKA I have to admit that it's not only about what I want to make but what can make. There is something dismantled in my work, and I try to create a coherent unity.

FRANÇOIS PIRON When you talk about the narrative and essayistic dimension to your work, I have the sense that this confirms the role that literary theory can play in art, the recent reconsideration of the use that can be made of structuralism, intertextuality. The appropriationists comment on intertextuality, but you make a very different use of it—more integrated, internalised.

RAPHAËL ZARKA It's true that I'm more likely to read Genette than Rosalind Krauss, for example. That probably comes from my love of books and fiction in particular. I'd even be tempted to say that I prefer publications to exhibitions. It's a stupid thing to say when my work is centred on sculpture, but I'm not all that interested three-dimensional space.

FRANÇOIS PIRON This relationship with books doesn't surprise me; we should also mention your notebook, which serves as a sort of catalogue of potential works. Are they future projects? Is the notebook a programme, an inventory?

RAPHAËL ZARKA Yes. When I have something like an idea, I don't make a drawing, I quickly write it down in two or three lines; it's a kind of

notebook of literary sketches. It's not really an inventory, or a programme. I'll note down an idea for a title as often as I make a note of a site, an idea for a piece of work; sometimes I copy a citation. I don't write down the date; I just keep adding to the list. When I happen to realise one of the projects, I don't cross or rub the note out—sometimes I add another line. But only rarely.

FRANÇOIS PIRON Do you go back over your notes?

RAPHAËL ZARKA Yes, because there are some that I forget about, and I constantly feel that I haven't got any ideas... Every time someone asks me to do something, I always think about whether I will be able to do it. So I open my file and I remind myself that there is that thing to follow up, or that project that I'd wanted to do for a while. It often happens that years go by between noting down the project and actually doing it. So, if after two years I'm still interested in a project, that means that it's time to do it, that's important enough for me to get totally absorbed in it. That's how I feel at the moment about a film project, for example, which takes Brancusi's process as a starting point. I always find the transition from the idea to using materials difficult. In the next few days, I have to go and cast the Michael Heizer at Saint Germain-des-Prés, and I really don't feel like going there with my wooden frame and my bucket.

FRANÇOIS PIRON Could your projects stay at the unrealised stage?

RAPHAËL ZARKA No, and that's the paradox. I don't feel like a craftsman at all, and yet I like images and I really like objects. I could spend my life writing books and catalogues, but I'd still want objects to exist physically so that they could be photographed...

FRANÇOIS PIRON Isn't it inhibiting to have so many things to do? In the ten pages of notes you gave me, there must easily be a hundred projects to be carried out in the next few years!

RAPHAËL ZARKA On the contrary, I sleep well at night!

FRANÇOIS PIRON Despite the essayistic dimension to your work, which the notes also shed light on it, if I had a criticism to make, it's the fact

that you put so little emphasis on the context in which work emerges: the compact nature of your work (whether photographs or sculptures) tell us very little about the situations, the attitude, the subjectivity you're working with.

RAPHAËL ZARKA I think I'm just beginning to understand the question of context when it's put in that way... It's perhaps so as to move in that direction that I said, a bit provocatively, that I prefer catalogues to exhibitions. Because, generally speaking, catalogues are the best place to mix different forms of documents. Some artists manage to incorporate this heterogeneity into the work itself. Maybe that's the direction I'm going in, I'm not really sure. On the other hand, though, I wouldn't like to have the documents relating to the forms that I evoke through my objects and my images (like the portrait of Pacioli, for example) in an exhibition.

FRANÇOIS PIRON It is certainly not a question of pedagogy. There is a place for monstration and a place for demonstration. There's a difference.

RAPHAËL ZARKA It's an interesting way to put it. It's important to me that the exhibition remains the place for monstration. But I'm still very interested in demonstrations.

FRANÇOIS PIRON I'm not sure that the exhibition can be a space for demonstration, it is not an argumentative space, because it's a space for montage: an exhibition doesn't prove anything, it only proposes a possible, temporal arrangement. An exhibition is more on the side of hypothesis, proposition, than definitive conclusions.

RAPHAËL ZARKA I agree with you, and in fact I like demonstration when it isn't closed. With an exhibition, it is a question of reflecting visually. The assemblages of works cannot only be argumentative. Earlier, I was trying to think of a word to describe the works that I like, and you suggested "compact". I think that's right. I could even go further, and talk about a porous compactness. Those two words offer a good explanation of my work.