

EXPLORING ARCHITECTURAL FORM: A CONFIGURATIVE TRIAD

SPRING / SUMMER 2018

Introduction

Transversing Formalisms

Stavros Kousoulas and Jorge Mejía Hernández, editors

The Grace Machine: Of Turns, Wheels and Limbs

Lars Spuybroek

The Diagrammatic Inquiry of Architectural Media

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**Reconceptualisation of Architects' Intentionality
in Computational Form Generation: A Tripartite Model**

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On Bigness and the Problem of Urban Form

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Calling Rowe: After-lives of Formalism in the Digital Age

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Introduction

Transversing Formalisms

Stavros Kousoulas and Jorge Mejía Hernández, editors

Daughter: Daddy, why do things have outlines?

Father: Do they? I don't know. What sort of things you mean?

D: I mean when I draw things, why do they have outlines?

F: Well, what about other sorts of things – a flock of sheep? Or a conversation? Do they have outlines?

D: Don't be silly. I can't draw a conversation. I mean things.

F: Yes – I was trying to find out just what you meant. Do you mean 'why do we give things outlines when we draw them?' or do you mean that the things have outlines whether we draw them or not?

D: I don't know, Daddy. You tell me. Which do I mean? (Bateson, 1972)¹

This is how anthropologist Gregory Bateson opens one of the dialogues – or, as he calls them, 'meta-logues' – in his book *Steps to an Ecology of Mind*. Extracted from the metalogue 'Why do Things Have Outlines?' the above conversation between Bateson and his daughter suggests that an outline can be understood 'as a threshold between disciplines; between things; between organisms and their environments, and importantly, how this threshold always needs to be tested.'² Not surprisingly, father and daughter cannot decide whether outlines are constructed or come in advance, whether they actually define the shape of a thing, or appear to do so only to our senses. Instead, Bateson invites us to assume that the shape of things comes out of

a 'negotiation across the threshold of an outline'.³ Despite the specificity of any shape or figure, outline or boundary, Bateson's metalogue indicates that form can be taken for something that is essentially unattainable. In this sense, to ask 'what is form?' implies a generalisation, which necessarily dismisses or neglects certain often important aspects.

This sort of generalisation is quite common among architects, as architectural historian Adrian Forty reveals in his critical dictionary of architectural modernism. Forty argues that the Western notion of form in architecture 'appears to have outlived its usefulness' and claims that the term 'has become frozen, no longer in active development, and with little curiosity as to what purposes it might serve'.⁴ Forty further suggests that its ambiguity (at least in the English language) is at least partially to blame.⁵ Form, he notes, stands for shape, but it also stands for the idea or essence behind that shape. These two different interpretations alternate between form understood as a mental construct, and form understood as the way an object or substance is perceived by the senses.⁶ In his opinion, what we know as the form-function paradigm, or the modernist belief that a univocal relation exists between the materialised shape of a building and the idealised human actions meant to take place within it, benefitted from (or fell victim to) this ambiguity.⁷

Granted that most functionalist propositions have been broadly rejected, Forty points out that

we should be suspicious of the apparent normalcy with which we continue talking about architectural form these days. Instead, he says, we must remain aware that form, as any other word, is always and only a device for thought.⁸ His argument seems almost self-evident. As media theorist W.J.T. Mitchell mentions in a somewhat playful tone, *everyone* knows that the concept of form has outlived its usefulness.⁹ Much more interesting, though, is the fact that this assumption (of the triteness or the banality of form) says much more about the epistemologies that developed around a very limited understanding of form, than about form itself. In other words, if we follow Mitchell's interpretation, we can only conclude that Forty's thoughts are not really focused on form, but on formalism.

Architectural theorist Sanford Kwinter has elaborated on this distinction between form and formalism, concluding that there is not really one, unitary and universal kind of formalism, but several different formalisms.¹⁰ Common among these formalisms – he says – are what he describes as poor and true formalisms. In Kwinter's opinion, the poverty of 'what is today collectively referred to by the misnomer formalism is more than anything else the result of a sloppy conflation of the notion of form with that of object'.¹¹ While this so-called poor formalism deals with the examination of fixed objects, Kwinter describes another kind of formalism – which he dubs 'true' – in relation to processes of formation, understanding form as an ordering action.¹² This means that rather than providing a *generic* account of objects (as typologies, classifications, and so on), Kwinter aims for a *genetic* account of how those objects come into being in the way that they do.

As editors of this issue of *Footprint*, we share both Forty's position regarding the paucity of modernist definitions of form, and Kwinter's urge to radically update our epistemologies. However, it is also clear to us that disregarding form as an obsolete concept

based on a modernist definition, or disqualifying a particular kind of formalism as 'poor', is simply throwing the baby out with the bathwater. Instead, we believe that a syncretic approach to formalism – one that is able to account simultaneously for architecture and for its effects by establishing transversal relations among several formalisms – should effectively improve on modernist dichotomies, as well as on postmodern claims for the autonomy of form.

It was based on this belief that we set out to explore current formal studies in architecture in the first place, echoing Mitchell's plea for an understanding of form as something that 'is not made but found, not constructed voluntarily but discovered as something we were already committed to without being aware of it'.¹³ As a result, the reflections collected in this issue elaborate on that commitment, and reveal that the study of architectural form is – contrary to Forty's interpretation – everything but frozen, evolving quite actively, and serving an important purpose.

It is clear to us that the following contributions proliferate beyond the aforementioned elemental question 'what is form?' with a host of additional questions, such as 'how is form? when or where is form? for whom, why and for what purpose?' This multiplication of the variables involved in the study of form suggests a shared attempt to provide us with an updated and valuable knowledge of not just one generalising aspect of form, but instead of the many variables that make architectural form and its studies subject to change.

Furthermore, this shared attempt appears to be aligned with our original decision as editors to follow a tripartite trajectory regarding formal studies, which included at least three different and rather popular perspectives. On the one hand, we invited architects to reflect on the way built form is produced, how it comes into being. On the other, we encouraged the study of the ways in which architectural

form appears in discursive or communicative terms. Finally, we embraced inquiries into the different relations that can be established between human actions, understood in the broadest possible terms, and the shape of the built environment. By interrelating these three approaches, we aimed to embrace and braid object-based approaches to form, approaches that examine the reciprocity of formal emergence, and studies dealing with information. Emulating Joseph Kosuth's well-known triptychs, our aim was to situate the question of architectural form between these three topical interpretations, which we referred to as architecture's configurative triad.

Still, we set out to survey this configurative triad departing from a concrete historical landmark that surpasses the form-function paradigm that Forty found so problematic. This landmark – not without its own problems – was the emergence of neo-rationalism in the early 1960s, as a direct reaction to modernist functionalism.¹⁴ Our aim with this choice was to recognise the weight of form-centred theories in postmodern architectural research; and although we felt that that landmark was meant to be superseded, we did not foresee the nature of that supersession, much less realise the extent to which it appears to be consummated.

Giovanni Corbellini's review article – the only that actually addressed the neo-rationalist tradition – does so tangentially, by focusing on an important though lesser known figure among the architects of the well-known 'Tendenza' group. Based on the work of Gianugo Polesello, Corbellini describes the complex exchanges that characterised the group's activity, rather than focusing on the specificity of their theories. In this sense, his approach to one of the centres of neo-rationalist architectural thinking somehow sets the tone for the whole issue: a tone of negotiation and nuance, acting on what Bateson would describe as the 'threshold of the outline' of architectural communication.

Along this threshold, it is clear to us that the following contributions tend to transverse several kinds of formalisms based on a common denominator. The reflections collected here coincide in understanding contemporary culture and architecture as reciprocally constitutive, and therefore complex, intense and heterogeneous. The prevalence of this understanding, and the subsequent belief that the process of determining, producing or appropriating built form must necessarily reflect these traits, has two interesting consequences.

First, it is clear that some of the following approaches to form aim for complexity in abstract terms.¹⁵ The radical break with the more generic strains of formalism suggested by this abstraction implies an intentional dismissal of a specific, object-centred, formalist tradition – if we are to follow Kwinter's suggestion. In addition, it resonates with Mitchell's plea that a commitment to form 'will require not simply returning to the concepts of form and formalism of yester-year or restarting old commitments. It will necessitate a rethinking of both terms and of the relation between them.'¹⁶

A second consequence of this understanding – also connected with Mitchell's plea – is clear in another set of texts, which still try to establish transversal connections between the more generic formalisms, and other kinds of formalism. These transversal connections explain why these contemporary studies on architectural form seem able to leave unproductive dichotomies – such as poor and true formalisms, or generic and genetic formalisms – behind.

We would like to underscore the importance of this supersession, convinced as we are that it is beyond these binaries where form mostly lies: active, full of potentials and agency, not to be approached in terms of *what it is* but in terms of *what it can do*. Said differently, we strongly believe that the crucial issue when it comes to architectural form is not to properly

define it, but rather to determine the effects and the limits of its actions. Such an endeavour, necessarily syncretic and transversal relies on a myriad minor questions.

Among these minor questions, Peter Bertram's paper focuses on what he terms an architectural diagrammatic inquiry, meant to negotiate the specificity and heterogeneity of analogue and digital diagrams. Bertram's reflections on the relations that exist between the instruments and methods we use to communicate our ideas, and the way those instruments and methods determine architectural form, are shared by Jack Rees and Duygu Tüntaş alike. Together, these papers confront the question 'how is form?' and further problematise it. While Rees advocates for a pedagogy of architecture that transcends our perspectival understanding of form, Tüntaş discusses organisational network diagrams as valuable instruments for the appraisal of intentionality in the production of form. Jointly – although to different degrees – these contributions suggest a radical revision of both the ontology of architecture and of the role of the architect.

Following a different approach, Armando Rabaça and Carlos Moura Martins explore the relation between urban and architectural form based on a rigorous study of big and complex buildings. While their study remains focused on well-known examples of twentieth century European architecture and urban planning, Johan Nielsen, Kris Scheerlinck and Yves Schoonjans develop a case-study that also negotiates contemporary urban and architectural form, but contemplates the possibility of that negotiation taking place between several contexts. A sociology of engagement – these authors claim – is a valuable instrument to describe the remote production of relatively equipotent architectural forms. Both of these contributions, despite their differences, wish to examine the questions 'when and where is (urban) form?' thus complementing and enhancing the previous morphogenetic accounts.

Introducing yet another line of thought, Stylianos Giamarelos discusses the possibility of revising the formalist bases of Colin Rowe's analytical theory. His aim is to make that theory operative in an age where – as Luca Di Lorenzo makes clear in his review article – our current understanding of form is best explained in relation to computing systems' software, interfaces, and hardware, as well as their interaction. In other words, both Giamarelos and Di Lorenzo address a timely contemporary concern: 'for whom is architectural form nowadays?'

Embracing most of the questions above, Lars Spuybroek suggests that, historically, form has always been able to account for the complexity, intensity, and heterogeneity we appear to be so eager to capture. More than software and hardware, more than any type of formalism, more than an historic account of any built form, Spuybroek notes that our relation to form can be understood as the interrelation between an object and the acts of giving, receiving and returning that object.¹⁷ In this respect, Spuybroek asks us, 'why is form?' – if not for a play of limits, a threshold between objects and events, a machine of grace and a machine for grace, that we both share and shares us back to the world.

In retrospect, as editors of this issue of *Footprint*, we may conclude by returning to one of Adrian Forty's main arguments: the claim that form is merely a conceptual device. What we think becomes evident throughout this issue is that such an approach to form fails to productively address the very complexity that form entails. In other words, by reducing form to just another concept, another word, we lose the potential to examine the actual effects that form had, has, and can have in both architectural theories and practices. Much more than simply a concept, we are convinced that form – in its ambiguity and in the heterogeneity of all the attempts to approach it – stands as a shared question, one that brings together disciplines, schools of thought and

variant methodological practices. Consequently, the contribution of this issue of *Footprint* to current formal studies in architecture is to problematise the question of form, by offering a transversal view among several different formalisms.

This view, we hope, should afford the production of theoretical, methodological and conceptual innovations in the field of formal studies. Furthermore, it seems to already explore novel trajectories that try to bind different kinds of formalisms, rather than separating them. Finally, we are inclined to believe that the shared view of architectural form which we provide here does not obey to the constraints of any given formalism but, on the contrary, turns those constraints into productive chances for a formalism *yet-to-come*. In this sense, Bateson's contradictory response to his daughter might start to become clearer.

D: I don't know, Daddy. You tell me. Which do I mean?

F: I don't know, my dear. There was a very angry artist once who scribbled all sorts of things down, and after he was dead they looked in his books and in one place they found he'd written "Wise men see outlines and therefore they draw them" but in another place he'd written "Mad men see outlines and therefore they draw them."¹⁸

Notes

1. Gregory Bateson, *Steps to an Ecology of Mind*, (Chicago: University of Chicago, 2000 [1972]), 37.
2. H  l  ne Frichot, 'Daddy, Why Do Things Have Outlines? Constructing the Architectural Body', *Inflexions*, no. 6 (2013): 119.
3. Frichot, 'Outlines', 120.
4. Adrian Forty, *Words and Buildings: A Vocabulary of Modern Architecture* (New York: Thames and Hudson, 2000).
5. *Ibid.*, 172.
6. *Ibid.*, 149.
7. *Ibid.*, 172.
8. *Ibid.*, 150.
9. W.J.T. Mitchell, 'The Commitment to Form; or, Still Crazy after All These Years', *PMLA* 118, no. 2 (2003): 321.
10. Sanford Kwinter, 'Who's Afraid of Formalism?' in *Form Work: Colin Rowe*, ed. Robert Somol (New York: Anyone Corporation, 1994), 65–69.
11. Kwinter, 'Formalism', 65.
12. *Ibid.*
13. Mitchell, 'Commitment to Form', 323.
14. Mario Gandelsonas, 'Neo-Functionalism', *Oppositions* 5 (Summer 1976): i-ii.
15. As Gilles Deleuze reminds us, the true opposite of the concrete is not the abstract but the discrete. The concrete abstractness of experience is indeed a trajectory that we have examined before in *Footprint* when focusing on the relation between architecture and the recent Affective Turn. For more see Deborah Hauptmann and Andrej Radman, 'Asignifying Semiotics as Proto-Theory of Singularity: Drawing is Not Writing and Architecture does Not Speak', *Footprint* 14 (2014): 1–12.
16. Mitchell, 'Commitment to Form', 323.
17. There is a remarkable similarity between this proposition and Carlos Mart   Ar  s's attempt to apply Karl Popper's theory of the three worlds in order to account for object, action, and communication in formalist studies of architecture. For more see Carlos Mart   Ar  s, *Las Variaciones de la Identidad* (Barcelona: Ediciones del Serbal, 1993), 33–43.
18. Bateson, *Ecology of Mind*, 37.

Biographies

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The Grace Machine: Of Turns, Wheels and Limbs

Lars Spuybroek

How do we live well? If there is one fundamental question that constantly occupies our minds, it is probably this one. There have been about a million different answers, half of which have come from religion and almost the same number from philosophy, not forgetting the multitude of aesthetic, psychological, therapeutic, hedonistic, practical and pragmatic answers. Too many answers, appearing in every possible combination. Taking out the last word and reducing the question to ‘How do we live?’ would make it infinitely easier to answer and would undoubtedly involve the bare cataloguing of all the necessities of the various domains. None of them would offer any clue whatsoever to what ‘well’ might mean – its definition can never be provided by a domain as such. Yet without exception, we apply the word to everything we do. We can drive a car and drive it well; we can cook a six-course meal and cook it well; we can lead a company and lead it well; we can take care of a difficult problem and do it well; we can run a marathon and run it well. We can do ordinary things extraordinarily, and extraordinary things far less well – either way. And when we have done something well, we can be fairly certain that next time we will probably be unable to repeat the act. There are no manuals for doing things well, as there are for doing things right. Taken literally, doing something right means doing it measured against an external standard, a ruler, a straight line divided up into proper increments telling us what is too little and what is too much. Certainly, there exist powerful external reasons for doing things, both causes and ends. We might be doing things ‘because’ or ‘for’;

however, to do something well we must employ an altogether different, internal measuring technique, which we denote as ‘the way’ we do things, relying on a rhythm, a pace, a course or a fluency while still incorporating those causes and ends. In doing something well, the cause, the end and the way of doing something are so intricately intertwined that we cannot separate them without destroying the effect of each on the whole.

Every single day, we find ourselves driven by a massive range of motives: we can do things out of sheer playfulness and relaxation, or spurred by a sense of moral duty, or as is more often the case, motivated by compensation, forced by physical necessity, or driven by hidden psychological desires or needs. And though all these variations – the spontaneity of play, the burden of duty, the effort of work, the necessity of nature – will play a prominent role in our analysis, none can tell us how to enact them *as never before*. This is undoubtedly an awkward statement, since it paradoxically implies that we have done that act a thousand times before and this time could be the best instance of it. We need to be cautious here: though such a process of instantiation singles out an act as unique, it does not necessarily mean we are looking for excellence. While excellence is continuous with a form of striving, that is not in itself its purpose. Doing-well or living-well does not involve a need for perfection. In its constant dealings with obstacles, it can never take form in a purified state; its constituent parts are always diverse and full of contrasts. What

we do and the way we do it might diverge. To do something well, we must often act against the very nature of the action, similarly to the technique of counterpoint in music. For instance, to play well, we should not act as if we are doodling; on the contrary, we should take the game completely seriously or else there is nothing at stake. As they say in football, it's life or death. And conversely, we can only do our duty as if we are playing tennis, since we would completely fail at a difficult task when doing it strenuously. Likewise, we can only do our work well if we find relaxation in it, and attend to necessities as if they sprout from freedom. How often do we not follow our desires as if they are our own ideas? Doing something well, then, means giving things a twist or a turn – the form action takes when we do several things at the same time. When driving well, we manoeuvre smoothly between slow- and fast-moving traffic, accommodate the behaviour of others, and operate without making abrupt changes. And when cooking that six-course meal, we time the preparation of one course to occur while the other is simmering on the stove and a third has been baking in the oven for hours. In these realms of action, the notion of turning and twisting can be interpreted quite literally, as actual curves left behind by a body moving in space. But the turn goes beyond mere pliancy and flexibility.

When we turn play into seriousness, or duty into ease, the turn is figurative, not literal. This concept of the turn goes much further than curvature and smooth movement between edgy obstacles, and undoubtedly further than a naïve opposition to the straightness of doing things right. It is made up of motion and activity, naturally, yet the movement in itself does not follow the way things take a turn. Our concrete movements are fed by a motion that is both larger and more abstract. The turn is larger than its agent. It is as much born out of a situation as it is initiated by an individual, and it is as much a figurative movement as it is concrete. In fact, it would be more correct to say the figure of the turn

stands by itself, and stands out as a figure that has been released from its origin rather than remaining attached to it. Doing something well, then, would be better described as a lessening of control than as an increase in it: a letting-go and a letting-happen more than a making-happen. Later on, we will have an opportunity to study examples of people who felt less present as events unfolded, especially in cases when things were going well – and the latter expression speaks for itself, suggesting that when one is doing well, things are too. In this sense, the figure of the turn should be perceived as a thing, and shelving it automatically under the category of motion, gesture or action will not suffice. In its figurative mode, the turn is not so much a movement between objects as it is the turning of movement into an object and, conversely, the turning of an object into movement – a reciprocal, symmetrical formula that will emerge as our central thesis.

Before our discourse starts to sound like an embarrassing misconception of quantum mechanics, we should hasten to point out that this fundamental vagueness of object and act has a history going far more deeply back in time than anything modern. In fact, its history winds through so many different periods that we cannot say exactly where and when it started – thousands of years ago, at least. From the perspectives of numerous disciplines, including anthropology, sociology, theology and aesthetics, the notion of doing well has been denominated as grace, a deviously complex term with linkages to gratitude, gracefulness and gratification as well as favour, pleasure, beauty and much more. The briefest way of defining grace would be to say it is movement that exceeds its agent, though admittedly such a cryptic definition calls for extensive elaboration. Grace is in many ways such an elusive concept that in each of the abovementioned disciplines it carries a completely different meaning. One explains it as an efficiency of mobility, another as an infinite power of transcendence, still others as mere good manners, and some as acquired customs and

habits. It is all of these and none. Grace is both the quality of the act and the movement that carries that act: in other words, it is both *of* and *beyond* the individual, anchored as well as unanchored, immanent as well as transcendent. How can this be? Certainly, for that reason it might seem a troublesome term for some, but studied more closely, the history of grace will not only prove comprehensive, but will demonstrate to be especially illuminating when viewed as a conceptual history. The further back we go, the more it will adjust later notions of itself. And though it has as many religious connotations as well as aesthetic, moral and social ones, this history will show that none of these domains is able to conceptually claim the ground on which we can explain the effects on the others.

Grace and gift

Nonreligious readers will quickly associate the term 'grace' with gracefulness, an aesthetic term that seems to originate in a bygone age when elegance and convoluted formalities regulated public behaviour, or when now-forgotten treatises on sculpture emphasised tentative gestures and a soft expression of the flesh. Religious readers, on the other hand, will immediately recall the singing of 'Amazing Grace' or recognise the term from Sunday-school discussions of sufficient and efficient grace, signifying the ultimate source of generosity and goodness. However, neither the wholly aesthetic nor the solely religious, even in its social or moral guise, can claim the powers of grace for itself. Actually, things are far more confounded: all these neatly distinguished domains of human endeavour become more and more inextricably tied up with one another the further back we trace the term's history. It would be impossible to understand the Judeo-Christian enterprise of institutionalising a superhuman grace without acknowledging that the idea has aesthetics at its core. And, conversely, it is as impossible to accept the aesthetics of grace without understanding it as involving at least some form of transcendence. Generosity and goodness,

however, are by no means terms that should be associated only with monotheism; we encounter them in at least as fundamental a form in a period when a myriad of gods populated the heavens, namely in ancient Greece.¹

At that time, grace was denoted with the Greek word *charis* (pronounced with a fricative 'h', as in the German *Bach*), and the concept played a central role in politics, love, friendship, competition and battle as well as religion. It is a word we encounter in many forms in the epic poems of Homer, Pindar and Hesiod, and in the hundreds of written works that constitute the classics. Today, we still find *charis* in words like 'charity' and 'charisma', to name just two derivations. Yet to properly understand the concept of *charis*, we will have to expand our study even further and go beyond that of the ancient Greeks, since *charis* is deeply rooted in gift culture, which in turn precedes Greek history by thousands of years. And it is not exactly clear – nor, perhaps, that relevant for our purposes – whether those roots lie in the Indus valley, in Minoan Crete or with the nomadic tribes living north of ancient Greece; probably in all three. Of course, gift cultures were and still are spread all over the planet, with the gift constituting a fundamental form of exchange in which aesthetics, sociology, economy and religion are undifferentiated. We will not be going into all the intricacies of gift exchange; what matters for our discussion is that *charis* conceptually originates in gift exchange, and that we will only be able to properly grasp the meaning of grace once we understand the gift.

The English word 'grace' is derived from the Latin translation of *charis*, *gratia*, and we encounter it in various forms related to gift culture: for instance, as 'gratitude', or thankfulness; 'gratification', the pleasure of receiving; and 'graciousness', a form of giving. In commentaries it is usually explained that *charis* is derived from the old Greek word for pleasure, *chara*.² Such a connection would start to explain not only why the exchange of goods as we

find it in tribal gift cultures cannot be unambiguously forced into social or economic models but also, and more importantly, why it took on the chiefly aesthetic connotations *charis* had in ancient Greece. The social as a concept, of course, is an eighteenth-century invention based on the *contrat social* and did not exist in the time of Homer. It would be a grave error to think all forms of togetherness were made of the same substance as the social. Similarly, it would be a mistake to confuse gift exchange with our notion of an economy, of exchange based on immediacy: we pay for things, be it entered on the side of debit or credit. Graciousness and gratitude are not part of its exchange values. The art of gift exchange is based on a subtle delaying of reciprocation, on the increase of esteem, on the sometimes overwhelming forms of repayment and the equally overwhelming forms of giving that we find in the tribal custom of the potlatch. If there is pleasure in the exchange of gifts, it is never what we – in the West, after Freud – would call pleasure: the satisfaction of the senses as related to an economy of the self. As the expression has it, we ‘take pleasure’ in something, and such taken pleasure is radically different from given and returned pleasure, therefore leaving a massive debt on the side of the subject. In Freud’s language, *Schuld* means debt as well as guilt. In contrast, the gratifying pleasure of *charis* is as much a pleasure of giving as of receiving and returning – that is, of going beyond the self. It is pleasure, yes, but not your pleasure; *you can’t truly own it*, since in the gift cycle *charis* is always being passed on. What we call objects and subjects are mere stations in the circulation of grace. And this is the main reason why any explanation of *charis* based on the standard objectivist or subjectivist theories of aesthetics is necessarily flawed.

To fully understand the circular nature of the gift, we must briefly turn to Marcel Mauss’s indispensable 1924 book *The Gift*, which begins with a startling question, one that – along with the

answers he subsequently offers – has occupied and often troubled scholars of anthropology: ‘What rule of legality and self-interest, in societies of a backward or archaic type, compels the gift that has been received to be obligatorily reciprocated? What power resides in the object given that causes its recipient to pay it back?’³ We would probably formulate the question somewhat differently and more subtly; be that as it may, what matters is that (a) Mauss makes it categorically clear that the gift is never free:⁴ every gift needs to be reciprocated in whatever form; and (b) that he locates the obligation to return not in mechanisms of the social or economic but in the ‘force of things’.⁵ In the Maori gift culture on which Mauss based his studies, this power is identified as the *hau*, often translated as the ‘spirit of the gift’.⁶ It is the *hau* in particular that makes gift-giving into a cyclical activity, not merely an oscillation between a giver and a receiver but making the receiver transform into a returning agent. Therefore, we should always keep in mind that gift exchange is structured according to three stages, not two agents, as our dualistic models of information exchange and communication prescribe. What exactly, then, is this power, which he calls the ‘force of things’? For almost a century, this has posed serious problems in anthropology. Some have vehemently denied its existence;⁷ others have developed variations or allowed asymmetries and unilateralisms;⁸ and still others have categorised it as a form of ‘personhood’, an animist notion⁹ in which the donor’s personality – somehow – remains in the given object, causing it inevitably to return to its source. After the social and economic models, this adds a psychological explanation for gift-giving.

However, all theories offering secondary explanations are bound to fail. After our initial explorations of the turn and grace, we might be able to offer a simpler solution. When object and act are inextricably entwined, the act of giving an object becomes the same as that object giving itself. Though this is

a rather abstract formulation, we recognise it from art: we never know if the effect a work has on us is equal to what the artist effectuated. And it is no accident that this example is derived from aesthetics. In other words, we will never be able to fully distinguish between *what an object does to us* and *what is done to it*. The vector of the action proceeds through the object without changing, without any real before or after, that is, *without origin or end*. Things are 'leaf-shaped', as Goethe would say, pointing both backward and forward in time. The act of giving turns into the object, slipping through to turn into the act of reception, and when giving becomes receiving, the reverse logically follows, closing the circle. Circularity is a matter of logic before it can be understood socially, economically or psychologically. The feelings of esteem (of the donor), pleasure (of the receiver) and gratitude (of the returner) that accompany gift-giving necessarily follow from the vicious circle in which the act bites the tail of the object.

The richness of feeling related to the gift cycle in cases of *charis* can be relatively easily uncovered by tracing the word's use in the classics, and especially its early use by Homer. The word appears in so many different contexts that translators of the *Odyssey* and the *Iliad* have found it excruciatingly difficult to match its meanings in their own modern languages. There is Achilles's persistent anger in the *Iliad*, stirred by his assumption that he has been insufficiently *compensated* by King Agamemnon for 'tirelessly fighting the enemy';¹⁰ Poseidon's questioning of the *generosity* of Odysseus, who offered the 'ships of the Argives'¹¹ in the *Odyssey*; the lack of *gratitude* shown by the suitors of Penelope, Odysseus' wife, left behind on Ithaca;¹² and moreover, the description of Hera's *charm* after she puts on earrings with 'three berry-like drops',¹³ which is similar to the description of the *charisma* of Odysseus, who, after anointing himself with oil, is 'made taller to look upon and mightier'

by the goddess Athena, while 'from his head she made the locks flow in curls like the hyacinth flower'¹⁴ – every variety of grace is denoted by that same word: *charis*. And countless other examples with different connotations can be found.¹⁵ After all these centuries, it remains astounding to see that a word meaning favour, generosity, gratitude, enjoyment, recompense or even literally payment can directly connote the swinging of earrings and the curling of locks of hair. But *charis* lies at the heart of a world that does not discriminate between actions and things: things act, and actions present themselves as things. The ancient Greeks would laugh at us with our miserable division between ethics and aesthetics. Who are we to subjectify pleasure and isolate it from gratitude and giving? Who are we to view activity as purely a means to an end? The act moves through the end, and the way of acting is itself an object, making the act something larger than intention or actuality – in fact, making it super-actual, since it embodies a surplus of action, not a single deed.¹⁶ Instead of viewing these overarching concepts as representing a primitive stage of confusion, we should acknowledge them as advanced, resolving the nagging dualism of thing and action by a circular logic – a logic clearly manifested in the tripartite structure of gift exchange.

Mauss firmly grounds gift culture in the notion of what he terms 'the three obligations: giving, receiving and returning'.¹⁷ And even though he uses words like 'grateful' and 'gratitude', he surprisingly disregards their evolution into cultures of grace and even explicitly refuses to 'take into account the aesthetic phenomena' related to the gift.¹⁸ In this respect, what the ancient Greeks offer us points resolutely in the opposite direction of Mauss's thesis: *charis* signifies each of the three stages of gift exchange, the cycle itself, as well as its intrinsic connection to aesthetics. As a matter of fact, the conflation of those meanings led to *charis* being personified by three goddesses, the Charites, or in

their Latinised designation, the Graces or the Three Graces. In the *Iliad*, where the divinities are not fully crystallised yet, Homer uses two different versions of the word *charis*, one capitalised and the other not. So far, we have only been looking at instances of the latter. Capitalised, the word functions as the name of one who in Homer's time was still a single goddess: Charis, 'wife to the far-famed lame god', Hephaestus, the builder of automatons.¹⁹ In the *Odyssey*, this single goddess has transformed into Aphrodite, the goddess of love and beauty, who hardly ever meets anyone without being prepared or accompanied by the Charites.²⁰ Hesiod, the Homeric poet from Orchomenus, is the first to identify the Charites by their names: 'Eurynome, the daughter of Ocean, beautiful in form, bore him three fair-cheeked Charites, Aglaea, and Euphrosyne, and lovely Thalia, from whose eyes as they glanced flowed love that unnerves the limbs: and beautiful is their glance beneath their brows.'²¹ The cult of the Charites originated from the same city, Orchomenus in Boeotia, of which Pausanias said that its king Eteocles 'was the first man to sacrifice to the Graces', represented by three rocks that fell from heaven, luckily in front of the king's feet.²² During that archaic period, the Charites were worshipped in Boeotia as spring goddesses, a clear reference to ideas of generosity and nourishing, as well as to the fact that grace was invariably 'poured over' mortals by the gods, while the pairing of stone and water corresponds to the intertwinement of object and movement.²³

A closer look at the names of the Charites – Aglaea, Euphrosyne, Thalia – reveals more about how they relate to Mauss's three obligations. Aglaea, which means 'radiance' or 'shining', is the figure of giving; Euphrosyne, meaning 'joy' or 'good cheer', the figure of receiving; and Thalia, meaning 'bloom' or 'flourishing', the figure of thanking and gratitude. According to Seneca, the Stoic philosopher Chrysippus was the first to connect the names

of the Graces to their actual positions in the gift cycle.²⁴ This observation could scarcely be of greater significance. As a rule, tribal gift exchange as we encounter it in Mauss concerns the exchange of actual goods, yet in its Greek form, represented by the Charites, the emphasis shifts to the feelings that accompany such exchanges. And, even more significantly for our argument, it opens up the radical possibility that feelings, things and acts can be exchanged with one another; that feelings can reciprocate gifts of objects, and objects can reciprocate graciousness. The moment goods take on the form of the good or the beneficial, the beneficial can free itself from material goods.

Of the three goddesses, Aglaea plays the leading role, one that is slightly more abstract, being closely related to the radiance of Aphrodite or even Apollo, in whom the act of giving is expressed by the shining sunbeams he wears as a spiked halo on his head, sunbeams that we recognise from the depictions of the Egyptian sungod Aten which end in stylised, open hands – a clear indication of the gift.²⁵ In this sense, Aglaea assumes the role of beauty that initiates a cyclical process of grace: a stage in which the object radiates movement. Euphrosyne personifies the reception of the gift in the form of joy. The few existing images show her drinking wine, and when we recall the prominence of springs in the rites of Orchomenus, we realise that she literally 'takes in' the gift. The gift is not just swallowed by Euphrosyne but wholly incorporated and internalised, which is why, of the three goddesses, this stage is associated most strongly with feeling. Thirdly, Thalia shows that the taking in of beauty does not stop with pleasure, as in the standard view of the last 300 years of aesthetic theory, but necessarily leads to a transformation, to blooming and flourishing. As an image of youth, Thalia personifies renewal, growth and prosperity; in becoming radiant herself, she assumes the role of Aglaea. The British classical scholar Jane Harrison characterised the Graces as

the 'givers of all increase'; the cycle adds one act to the next, and then to the next; they keep multiplying each other's effects.²⁶ In the cycle of grace, things keep turning. Viewed as round dancers, the Graces in fact change positions: giving becomes receiving, receiving becomes returning, and returning giving, one transforming into another.

Ancient iconography depicts the Graces without exception as dancing figures. Not coincidentally, the name of the city Orchomenus has the same etymological root as the word 'orchestra', meaning 'dance floor'.²⁷ On bas-reliefs from the Archaic period, the Charites are initially clothed and line up single file, strictly aligned, all looking in the same direction. They hold hands, grasping their attributes in their free hands – usually a piece of fruit, a garland, or a flower. Over time, we observe an increasing variety in the way they hold hands, while the expression of dancing becomes more prominent. In ancient Greece, dancing was a collective activity, with dancers moving in geometrical patterns, as in the round dance. While the Charites are mostly shown smiling and looking in various directions, they still line up, with one hand engaged in linking and the other hanging down. It is not until the later Hellenistic period that we see the circular configuration emerging. The figures were increasingly depicted nude, and though the figures became more three-dimensional, the sculptures as a whole remained flat and linear, though they were intended to represent a round dance. This paradox was solved with an ingenious invention: the middle figure was turned around so that her back faced the viewer. It makes all the difference. Since most sculptures were positioned against a wall and still acted as reliefs perceived in frontal view, they resembled the archaic A-B-C lineup, but looking closely at who holds who in the new configuration, we discover an A-C-B pattern: a circular organisation in which the figure on the left (A) holds hands with the figure on the right (B), while the turned figure in the middle

(C) holds the hands or shoulders of the other two.²⁸ These hands are closing the circle, while the two remaining hands hold the necessary attributes.

Again, it is the Roman Stoic philosopher Seneca who connects their going hand in hand to the gift cycle, with 'one who bestows the benefit, one who receives it, and a third who returns it'.²⁹ This is the round schema we recognise from *Primavera*, the acclaimed painting by Sandro Botticelli, and the life-size statue *The Three Graces* by Antonio Canova, which we can walk around because of the unimpaired three-dimensionality of the figures and the configuration as a whole: a circular structure in which all limbs and digits – legs, arms, hands, fingers – are engaged in creating a single model of grace. The Charites function as one and three simultaneously. In the cyclical system of the round dance, the triad of three goddesses, similar to other 'maiden-trinities' such as the Horae (seasons) and Moirae (fates), accompany and guide events as *recurrent*, not as part of a linear, progressive timeline.³⁰ Yes, things change, but only according to rhythms and cycles. In mythology, these triads invariably operate in a covert manner, staying in the background where they can influence others without directly intervening themselves. The power of these women triads lies in their acting indirectly, never as protagonists of the story, and always as maidens, i.e., unattached. They act in stages, with things moving incrementally toward an end, and they act recurrently, with all their actions repeated, either over short, daily periods or very long time spans such as the seasons or the cycle of life and death.

We encounter the same ambiguity between one and three, as well as between object and movement, in the Charites' strange relationships with other gods, Aphrodite in particular. The Charites are three figures, and Aphrodite one, but Aphrodite is constantly attended by the three, and the three act

as one: their cycle is closed, and they dance as one. That Homer capitalised Charis's name in the *Iliad* was certainly no accident, nor was his confusion of her with Aphrodite in the *Odyssey*. The Romans translated *charis* as *venus* as often as they translated it as *gratia*, emphasises Karl Kerényi, who likens the Charites to 'a sort of threefold Aphrodite'.³¹ There are numerous episodes in which the Charites accompany Aphrodite, weave an 'ambrosial robe'³² for her, anoint her with 'immortal oil',³³ or assist her in a prolonged bathing ritual. Despite all the ambiguity, the myths still present us with a single Venus and a triad of Graces (here we switch from Greek to Roman denominations), a distinction made manifest in Botticelli's *Primavera*, in which Venus approaches us frontally, and the Graces dance with each other. Venus, in the orientation of her gestures and her gaze, engages with us, while the Graces, with their glancing eyes and entwined fingers, are wholly absorbed in each other. Such iconography shows how Venus *initiates* events, and how the Graces, like the Horae and the Moirae, influence *the course of events*: a subtle distinction that is consistent with the majority of depictions. Fortunately, Botticelli does not even make the slightest attempt to portray them as actually dancing; he is much more interested in the interlacing of the fingers and hands – one pair of entwined hands high up, the other at eye level and one down below – than in the positioning of the legs and feet.

The Italian sculptor Canova appears to be even less interested in portraying the Graces as dancing in his large sculpture of them. In marble, it would surely look ridiculous; as the word denotes, a statue stands. In all the swirling of gestures, of bent arms and bent legs, standing remains the essential problem of premodern sculpture; the physical question of how to stand must be answered in the statue's conceptualisation. This is absolutely crucial. A mere representational depiction of a 'graceful' movement would never reveal the powers of grace; only the

combination, interdependence and interpenetration of standing still and moving around can do that. Both works of art have found their own way to what we have been calling the figure – or what we should perhaps term *figuration* – Botticelli via the abstraction of lines, Canova through that of posture, the figure being that strange entity occupying the gap between the abstract and the concrete, force and form, or, to use the terms we have used since the start of this essay, movement and object. Botticelli and Canova have found solutions that allow us to view Venus and the Graces as intricately overlapping, or, more precisely, as modifying each other *contrapuntally*, one taking on the ways of the other. The graceful acts as an object, and the beautiful object radiates movement.

What, then, is the actual difference between beauty and grace? They are deeply interrelated but categorically different, and we should make every possible effort not to make a muddle of their complex relationship. In the descriptions above – the dance of three figures becoming one circular configuration, the progression of time returning to its starting point, and the Three Graces being attendants to a single Venus – we see a very special form of their role-switching that directly involves a reversal of object and movement. In his 1793 treatise 'On Grace and Dignity' (*Über Anmut und Würde*), Friedrich Schiller tries to solve the riddle: 'The Greeks still maintained a distinction, then, between grace, or the Graces, and beauty, since they attached attributes to them that do not apply to the goddess of beauty.'³⁴ Then, on the next page, he rigorously spells out his definition of how the two should be distinguished:

Grace is a movable beauty [*Anmut ist eine bewegliche Schönheit*], a beauty that can appear in a subject by chance and disappear in the same way. In this it distinguishes itself from static beauty (*fixe Schönheit*), which is necessarily granted along with the subject itself."³⁵

It is the perfect formula. Edmund Burke's definition in *A Philosophical Enquiry*, which contains only a single, short paragraph dedicated to grace, is similarly structured but falls short in its conceptual depth: 'Gracefulness is an idea belonging to *posture* and *motion*.'³⁶ Burke identifies the same problem as Schiller: that grace should be viewed both as posture, i.e., standing still, and as motion; however, he accomplishes very little with the neutral conjunction 'and'. In merely adding stillness to movement, he fails to synthesise the two. Schiller, however, does exactly that. By contrasting the adjective 'movable' with the substantive 'beauty', he applies the 'rule of the turn' we formulated at the beginning of the essay, and more precisely in the previous paragraph: to make what we do and the way we do it – i.e., *what* and *how* – contrapuntal to one another. As a consequence, grace cannot be simply equated with movement or ease of movement, as, for instance, Paul Souriau and Herbert Spencer did.³⁷ Theirs concerns the beauty of motion, Schiller's that of movable beauty, which is something fundamentally different. Grace is motion that acts like an object; it is the Graces acting like Venus, dancing acting like standing, time acting like stoppage, three acting like one. (Clearly, the phrase 'acting like' begs for an explanation, but we will have to save that for the final part.)

In following the same logic for beauty, however, we should deviate from Schiller's labelling of it as 'fixed beauty', as seen in the quote above, an interpretation that fits the traditional, classical notion of beauty as timeless, similar to Keats's 'slow Time' in 'Ode on a Grecian Urn'. For the writer of *On the Aesthetic Education of Man*, beauty relates directly to structure, to standing and stillness; it is the 'architectural beauty of the human structure [*Bau*, literally 'build'],' evidently identified with gravity, seriousness and duty. The English word 'serious' shares its etymological origin with the German *Schwer*, or 'heavy'.³⁸ At first, Schiller performs his extraordinary

manoeuvre by placing grace in between pure movement and pure stillness, not via ambiguity, paradox, mediation or superposition – some of the terms we have used so far – but through the figure of counterpoint. In doing so, he was solving the enormous problems Kant had created by separating morality from aesthetics, which for Schiller had been the main incentive to write 'On Grace and Dignity'. Viewed from this perspective, the German poet-philosopher was trying to repair the intricate connections grace and gravity had shared in the Greek perception of *charis*. And for us, *charis* offers the main conceptual framework for understanding grace in its relation to beauty. Why, then, if grace can claim stillness, should beauty not be able to claim movement? The rule of the turn can be applied in both directions. Schiller would only have had to adopt the same technique for solving a paradox by using the adjective turn of the substantive.

With such a reversal, a formula for beauty emerges that was in fact concocted by Henri Bergson in 1904: 'Beauty ... is arrested grace'.³⁹ Beauty, then, is not on one side of the equation, identified with the fixity of the object, but rather occupies the same middle position as grace, while operating the other way around. Beauty is an object that acts like it is moving. Or, in a terminology used earlier, it is a still object that *radiates* movement – a formula that fits the towardness of Venus and the halo of Apollo as much as it does the shining of Aglaea. Although beauty is not the principal subject, we should mention that radiance is a concept that is as crucial to an understanding of ancient Greece as is *charis*.⁴⁰ It explains why Homer confused Charis with Aphrodite, and why words such as 'glowing', 'shining', and 'gleaming' flood the pages of the epic poems. It explains the Greeks' obsession with anointment, Odysseus's shining locks of hair, the endless combing and bathing, the gold on Achilles's shield, the fluting of marble columns, the polychrome paint on the same marble, and the gold

leaf that filled the eyes of marble statues.⁴¹ Beauty is *charis* for still objects. It should be regarded as occupying the same middle position as grace, and solving the same opposition between still object and acting motion, yet in the opposite direction. We should never put beauty and grace in a dualistic relationship; in fact, they both resolve dualist oppositions, but in reverse order. Beauty turns into grace, and grace turns into beauty. Figuration consists of nothing but turns, and turns only.

The attentive reader will have noticed the ellipsis leaving a little gap in the Bergson quote, a void we should hasten to fill: 'Beauty, said Leonardo da Vinci, is arrested grace'.⁴² It is a rather awkward quote, in a way, since the phrase is nowhere to be found in Leonardo's *Treatise on Painting*. In fact, Bergson's is an imaginary quote, based on his attentive reading of the French philosopher of habit and grace, Félix Ravaisson, who we will attend to later; but no matter – as a formula, it is as perfect as Schiller's. In the knowledge that Leonardo's treatise was written in the 1490s, Schiller's essay in the 1790s, and Bergson's lecture in the early 1900s, we should acknowledge the consistency of their discoveries by terming the reciprocity of beauty and grace the 'Leonardo-Schiller turn'.

It should not surprise us that Leonardo da Vinci's name enters the discussion; he had many things to say on the topic of grace, and we hardly have to mention explicitly that he shared Schiller's interest in the 'beauty of the human structure'. Leonardo's dazzling knowledge of human anatomy is well known. Looking at his anatomical drawings, we immediately see why his studies are so crucial for our argument: the human body is a complex network of connective elements. Ligaments, sinews, tendons, arteries, bones: it is as if the human body itself is a drawing, made up of linear elements intertwining in ever-darkening relationships while never fully retreating from visibility. This complex network led Leonardo to completely rethink the problem we

have mentioned a few times now: that of standing. One might think standing was a problem of connecting bones together, as one would the posts and beams in an architectural structure – that is, a problem of compressive forces. But Leonardo finds as many muscles and tendons in the human body as he does bones, analogous to his interest in the pulleys, springs and ropes that fill his notebooks. The problem of standing – of 'equipoise' as he calls it – is as much a question of tension as of compression. The two must be understood in relation to each other and as working in concert. How does the human body stand gracefully? If we apply the same rule of counterpoint we did earlier, we should answer, 'By standing flexed', or even 'By standing weakly'. We stand in *contrapposto*, with the *what* and *how* of standing in direct contrast. Or, to put it in even more aesthetic terms, we do not stand in the Doric manner, with our legs apart; we stand in the Gothic manner, with our tendons pulling us up while our bones hold us down. The opposition between motion and stillness that Schiller resolved in the domain of ethics in particular had been likewise resolved by Leonardo a few centuries earlier in aesthetics. For Leonardo, posture is about neither the dynamics of dancing nor the stasis of standing. No, it is about the *activity of standing*, the pulling and pushing of standing. There is nothing static about standing still; ask any dancer how difficult it is. Obviously, this implies the need for grace and the figure of grace.

In his *Treatise on Painting*, Leonardo calls it 'Grace in the Limbs', and his advice for draftsmen and painters is to 'let them be easy and pleasing, with various turns and twists, and the joints gracefully bent, that they may not look like pieces of wood'.⁴³ And not drawing them as pieces of wood means paying extra attention to the hinging of the joints, and, more importantly, the coordination of all the various flexions into a set of what he identifies as undulations:

Consider with the greatest care the form of the outlines of every object, and the character of their undulations. And these undulations must be separately studied, as to whether the curves are composed of arched convexities or angular concavities.⁴⁴

In the section titled 'Of Undulating Movements and Equipoise', he adds: 'When representing a human figure or some graceful animal, be careful to avoid a wooden stiffness; that is to say, make them move with equipoise and balance so as not to look like a piece of wood.'⁴⁵ Now, what exactly are these undulations or curves, these lines that appear in the figure that later became known as the *figura serpentinata*?

These are not simply curves liberated from the stranglehold of straightness, some trace of freedom that has wrested itself away from necessity. What could be more naïve than such a view? Again, all the figures Leonardo analyses *stand*; that is, they are organised around a vertical axis – and there is nothing straighter than the axis of gravity. Something far more complex than escape or liberation is going on here; rather the opposite: *all the curves are engaged in actively constructing vertical straightness*. The fingers, the hands, the arms, the legs, the neck, the spine: all the parts are individually mobilised to collectively achieve stillness. Again, we are not playing with paradoxes or metaphors here. The figure of grace is not some swooshy gesture drunkenly sliding over the slippery whiteness of the paper but rather a set of curves interrelated by a rigorous logic, a *configuration* organised around an invisible internal ruler. It is as if all the bendings of the curves cancel each other out against a perfectly vertical, but dashed, straight line, allowing the figure to stand, and not fall from grace.

To interrupt myself for a moment, figures do not seem to sprout from the ground or emerge from a background, as figures are commonly presumed to do. The type of figures we are investigating here

neither drop down from the sky nor rise up from the earth – i.e., they are neither produced by mere transcendence nor by immanence. Studying the historical evolution of *charis* and grace allows us to discern another form of production, something that has not fully crystallised yet in our analysis, though we can see some of its major aspects emerging. The figuring of grace appears to be based on a set of complex interactions, what we should perhaps call a machinery of workings. The figure seems like a machined product that occurs between two zones of influence, with (a) on one side, the input of a rhythm, of a turning cycle that conveys a constant supply of activity without producing specific activities as yet; a stream that does not in itself produce the figure, since for that to occur, the stream needs to (b) meet the vertical axis of gravity at the other end. It is as if grace relies both on a temporal component, a turning wheel, and on a spatial component, a standing structure, with the figure suddenly appearing in the gap between them, like an electrical arc between two poles.

In this sense, grace is definitely a figured line or group of lines, and this one-dimensionality is no accident, because the line is the dimension of the way, and the way is as much a trajectory as an object. But it does not exist by itself; without its poles, the lines are plotted in relation to each other without any external regulating device – therefore, it is precarious to formalise the line. We should be careful to consider the serpentine line as a 'line of grace', as the English painter William Hogarth famously did in *The Analysis of Beauty*,⁴⁶ as a line similar to the Mannerist *furia della figura* as advocated by Giovanni Lomazzo, who introduced the term *figura serpentinata* in 1584.⁴⁷ That said, Hogarth's S-figure shows more internal measure than we encounter in the fury of Mannerism, enabling the figure to create the large variety of configurational groups we find in Hogarth's work; people gathering in the street, dancing in a hall, or discussing politics at the table are always depicted as intricate

sets of nested serpentine. Mannerism hardly ever shows such converging entities, only doing so in sculptures such as Giambologna's *Rape of the Sabine Women* – logically, because it is an actual statue, in which the problem of standing is inherent. Especially in painting, its serpentine operate as lines of divergence, of groups being scattered apart.

It is useful to remember that in Greek mythology the anti-Graces were personified by the Erinyes, also known as the Furies, figures of purely chthonic heritage. Leonardo's line is, as stated, not one of pure movement but one that measures itself against the act of standing, a feat we observed likewise in Botticelli and Canova. The exceptional quality of Botticelli's depiction of the Graces in *Primavera* lies in the fact that the painting behaves as a drawing. Not only do the legs, arms and fingers behave as lines; the contours, the tresses of hair, the folds in the sheer dresses all exhibit a strong but unusual sense of schematics and design. The resulting awkwardness is crucial to the work's quality. Though it was surely the reason why Walter Pater called Botticelli 'a secondary painter', any form of naturalism would have destroyed the work's power of figuration.⁴⁸ We cannot 'depict' grace, because the notion of a picture or image goes directly against that of a figure. The manifest presence of design makes *Primavera* more a Gothic than a typically Renaissance exercise; the latter always emphasises the solidity of volume, while the former revels in the kind of delicate linework we find in tracery and illuminated initials. Even the folds in the fabric, which usually seem to emerge from a textile surface, seem here to exist on their own, as figures, especially in the dress of Venus, whom we could easily mistake for the Virgin Mary, surrounded as she is by a foliate halo set against an arched niche magically created by two symmetrical trees in the background. When we step back to absorb the work as a whole, it becomes increasingly impossible to escape the sense of medievalism: the general lack of depth, the figures depicted at a similar size, floating on a sea

of fruit and flowers set against the dark green background of a forest – it all makes *Primavera* appear more like a tapestry than a perspectival view of volumes in space.⁴⁹

Admittedly, declaring one of the highlights of neoplatonic artistry to be a Gothic project is pushing the argument; doing the same with a neoclassical wonder like Canova's *Three Graces* borders on the hyperbolic. But just look at it: except for the fact that it refers to the classics, Canova's work can hardly be termed classicist when compared to the deep-frozen stiffness of Ingres or Alberti. Maybe the best solution is to phrase things in contrapuntal terms again: it is using a classicist style to do something Gothic. A Gothic end achieved in a classical way. Almost all the limbs are in a flexed, weakened mode, except for a single leg of each of the goddesses, who stand in contrapposto, one leg straight and stressed, the other bent and relaxed. The glances; the opening of the fingers; the gentle placing of hands on shoulders, breast, and cheek; the springy ringlets flowing down; the single piece of cloth they share; the downcast eyes of Aglaea in the middle; her slightly raised position: it is as if there is an all-out weakening and softening of all the parts that, when they are interlaced, creates this inseparable group, standing as if by magic. In a way, they all let go, but instead of collapsing, they find one another and stand fast. Strictly speaking, we do not see three figures, the Graces, but dozens of figures at every scale from fingers to whole bodies, every one of them engaged in this single act of collaboration, creating a flexible network in the sense of Leonardo's anatomy: a flexible system of holding, touching, pulling and pushing that finds this singular figure of grace.

Grace and habit

Describing grace as a machine, then have it followed by analyses of art, makes us gradually realise that art has inexorably steered toward an impasse in the channelling of grace. As grace

became more and more established in the realm of the aesthetic, the aesthetic removed itself more and more from everyday life. If we wish to live well, it will never suffice to punctuate our everyday lives with visits to the museum or, for that matter, the church. We fundamentally need grace in life itself, at its most trivial moments, whether we are driving a car, cooking a six-course meal, taking a cup off the shelf to pour ourselves some tea, or sitting in a chair. Only the conceptual power of the figure explains sitting in the chair and getting up from it as a single activity, even a single object: still action and mobile action share one and the same continuous line. One might think this was the most trivial thing in the world, and in practice it is, but conceptually it is not. Getting up from a chair is as miraculous as a bird leaving its nest: *there has to be movement before you start moving*. How is this possible? It can only be understood (a) as a movement that is 'built in' as an inclination or excitation by the architectural *Bau* of the body so admired by Schiller and Leonardo – that is, as much by its weakness as by its strength, allowing mobility and stillness to coexist – and (b) if the act has been executed before, i.e., if the act of getting up precedes the sitting in the chair. These are the wheels of habit, but also of training, practice and imitation. Habit enables grace; doing-well is in one way or another dependent on doing-again – on recurrence, as mentioned earlier. Yet first and foremost, the production of grace takes place in the realm of the everyday and the ordinary.

These observations converge in the work of Félix Ravaisson, the nineteenth-century French philosopher of habit, and the only philosopher of habit who related it to grace as well as to what he called Leonardo's 'flexuous line'.⁵⁰ Through contemporary eyes, we might view habit as the source of boredom, rut and repetition, and no small number of philosophers has supported this view, Kant included. However, when we think of the habitual nature of the cycle – of our everyday activities but also of larger cycles, the monthly, the yearly, and

those of life and death as we have discussed them in the context of the Charites, the Moirae and the Horae – relating grace to habit becomes wholly relevant. By way of a quick introduction, let us consider a few of the references made by Pierre Hadot, who regularly mentions Ravaisson's notion of habit. In *The Veil of Isis*, for instance, he contextualises Ravaisson in relation to Pascal's *Pensées*:

Pascal may have thought of another "habitual" movement of nature when he wrote: "Nature acts by progress, *itus et reditus* (going and returning). It passes by and returns, then goes further. Then twice as little, then more than ever, etc. The flux of the sea takes place in this way, and the sun seems to advance in this way."⁵¹

In several of his writings, Hadot also refers to Bergson's imaginary Leonardo quote. In another, on Plotinus, he refers to Ravaisson's linking of habit and grace: 'Life is grace. No one has understood all the implications of this Plotinian experience better than Ravaisson in his *Philosophical Testament*. Grace, he tells us there, is "eurhythmia"; that is, "movement which does well".'⁵²

The above quotes create the impression that Ravaisson fully equated habit with grace, but this is not always obvious. In his early, 1838 work *Of Habit*, Ravaisson compared habit to 'prevenient grace', that is, to the Christian concept of God's efficiency, enabling humans to act, choose and move.⁵³ Later, Ravaisson develops a more complex, distributed argument, supported by his interest in Leonardo's serpentine posture and his thirty-year research into the Venus de Milo, two cases in which grace appears as an actual, standing figure.⁵⁴ Reading Ravaisson, we begin to discern two sides of grace: a habit side that enacts the role of the turning wheel, creating the flux of activity, and a more aesthetic, graceful side that appears at the moment of figuration. At this point, the question arises of whether the rhythmic *wave line* of the flux directly and necessarily leads

to the *serpentine line* of the figure. From the above quotations, it is clear that Pierre Hadot viewed them as continuous, since he often confounds them. We do not require an extensive argument to see why they are so different: the wave line is fundamentally horizontal, while the figure of grace is organised around a vertical, as we have learned from Leonardo and Schiller. Habit and grace must be strongly related, yes, but they cannot be identical, since they differ in their connection from one to the other. The simple fact remains that we carry habits with us, while graceful acts are situated; they need to be found. Habits we have; grace we do not.

Here we are peeking a bit ahead in the argument, but as an initial sketch it helps us to start filling in the picture of the 'grace machine' and what we have called its two poles. Whereas a few pages back we stated that one pole of the machine consisted of a temporal wheel and the other of a spatial structure, we can now, thanks to Ravaisson, rephrase and call the former *the pole of habit*. In consequence, we should term the latter *the pole of inhabitation*, the other half of the grace machine which was of no particular interest to Ravaisson. If this distinction between the two poles has any validity, it means habit does not fit directly into the space of inhabitation, since for poles to work, they need to be apart. Needless to say, this goes against our fundamental beliefs: how can we trust anything if habit cannot rely on the things it surrounds itself with? The two poles are separated by a gap, and the machine produces the figure of grace to bridge them. But let us slow down and return to Ravaisson.

As with Schiller, it is not my aim to offer a detailed reading of Ravaisson's work; there are more than enough excellent discussions of both philosophers. Instead, we should concentrate on how habit can be understood in the framework of grace, and via grace, in the context of the ancient concepts of *charis* and the gift cycle. Seen from this viewpoint, my project is virtually the opposite of Ravaisson's,

namely to find a way to position habit – and subsequently inhabitation – conceptually within grace, and not the reverse. Our topic is grace, and how it appears between habit and inhabitation, or better, *in the gap* between habit and inhabitation. If we were to take habit as the starting point for arriving at an understanding of its relation to inhabitation, the magic or effortless grace would at best result as a fortunate outcome, and at worst as a product automatically dropped off the end of habit's conveyor belt. It is neither: grace is uncertain and undetermined. Grace needs habit, but habit does not necessarily lead to grace, and grace therefore functions as an end to strive for, be it in our individual behaviour or collectively. Figuration, then, should be viewed as the goal, and habit as an essential part of the ontological machinery for achieving that goal. The *telos* of things is to go well.

Many of Ravaisson's constructions support this idea, especially because he succeeds in bridging numerous concepts like habit, grace, figuration and education. By conceptualising grace within the framework of habit, he restored some of the transcendence that had been lost in the aesthetic route that we chose to follow in our brief history of grace. On the other hand, it must be said that though Ravaisson's intuition served him well in his connection of habit to grace in his early treatise *Of Habit*, a closer reading of his later essays shows that, in fact, he came to view the two as continuous. In the end, Ravaisson perceived the rhythmic wave line of habit as identical to the serpentine line of grace, as Hadot indicated. My question would then be: How would the past ever flow into the present without transformation? That would be impossible; the present is by nature situated and therefore needs to meet the conditions of verticality along with those of rhythm. After all, when the issue arises how grace comes into existence, we should realise that the word 'existence' is derived from the Latin for 'standing', *sistere*; a connection we encounter likewise in the German *Bestehen*. Ravaisson

became convinced that the serpentine line in itself was enough to display the presence of grace. This is most apparent when, in his essays, he merrily switches back and forth between descriptions of Leonardo's and Michelangelo's respective uses of the S-figure, unaware of the yawning gap that separates the two Florentine masters on this score.⁵⁵ For Michelangelo, the serpentine line is a freely swerving figure that acts as if liberating itself from the weight of the marble block, while completely dependent on its structure to exist. He therefore operates fully within the classic opposition of grace and gravity, while Leonardo's concept of grace aims to dissolve that dualism by including gravity in the figure. As we saw earlier, for Leonardo, the serpentine figure is *a way of standing*: the swerving curve and the dashed perpendicular merge in a single, noncontradictory structure of grace.⁵⁶ Though he was a fervent student of Leonardo's work – and the Venus de Milo – Ravaissou did not recognise that dashed vertical, a line that for us plays an essential role in structuring inhabitation.⁵⁷ Grace is not some angelic curve freeing itself from gravity like a plume of smoke; no, it finds standing; as an instance of *contrapposto* it demonstrates how measured freedom allows us to find a stance. Evidently, that is what instantiation means.

Nevertheless, it cannot be emphasised enough that Ravaissou touched the heart of the matter by connecting habit and grace. Regardless how we define grace, it involves a movement that exceeds its agent, and such excess can only be supplied by habit. Ravaissou, in another way of saying that this movement is larger than us, writes of the 'effacing of effort': our actions become more and more effortless, as if carried by a greater force.⁵⁸ According to many philosophers of habit, including Ravaissou, habit is based on the fact that at the moment we reach a certain level of effortlessness, the inclination to repeat the act increases, while at the same time, the feelings that accompany the act decrease.⁵⁹ In the framework of grace, we can appreciate the

increase of inclination: we act as if we have the wind at our backs; the act becomes increasingly easier. If nothing else, grace is favour. The second part of the argument is far less convincing, if at all. Of course, in acting with less effort, we act with *reduced consciousness* but, as grace tells us, *with increased feeling*. Habit may be numbing; grace is not. In fact, there seems to be more feeling from the moment consciousness stops raising barriers. Just watch a person doing something well – say, driving that car we mentioned at the beginning, smoothly swerving around problems, stopping with foresight, checking the rearview mirror and adjusting his or her speed in between. Probably the driver will have forgotten the whole trip if asked for details afterwards; definitely a case of diminished consciousness. But would we also say he or she drove with less feeling? No, on the contrary, we rarely encounter so much feeling and tact. Every detail is absorbed, the minutest movement taken up in the activity; it is as if the car is surrounded by a halo that registers and processes every movement. When one is driving well, everything is networked and coordinated. We can hardly tell what is happening inside and what outside. The inside of the driver's body, the interior of the car, and the outside events form a single, yet impersonal sphere.

The driver acts in a state of blessing, similar to the effects of the gift: at first bestowed externally, the gift is wholly internalised, to be acted out again externally. Is the driver 'transported', or does the halo issue from him or her without meeting any obstruction? It is impossible to tell: transcendence and immanence make equal claims on the cycle by taking turns; that is, one acts as the other. We cannot say for sure who acts through whom and what acts through what, except that it concerns an extreme form of harmonisation – the reason why grace has such close ties to beauty. Habit starts with effort and moves toward effortlessness, as if things are moving by themselves, though such a state of grace would be impossible to find without

the expansion of feeling. It is certainly correct to say that with increased effortlessness the act liberates itself from its subject, but not from feeling. As stated earlier, in the gift cycle we don't own our feelings. The inclination is not merely to drive, or a liking to drive, but to drive well. Habit transforms the first step into the second, the skill of driving into the pleasure of driving; and grace transforms the pleasure of driving into driving-well. Habit is the run-up to the jump of grace. It explains *forwardness*, but grace explains *towardness*.

A disturbing question creeps into the mind. Is there any correspondence between the ongoing example of driving as finding grace and the description of grace as a machine? In short, yes, but the longer answer is: not in the way we might think. Though it is a machine, grace is never an assured outcome. While habit is surely part of its mechanism, we are looking at a machinery that runs on certainty in one direction and on uncertainty in the other. From grace to habit, the machine's workings are determined; from habit to grace, they are not. Never will it be certain that doing-again will result in doing-well; the machine does not produce grace as a commodity. Every time we act, we add speed to the turning wheel of habit, and thus to the transcendence of grace; however, grace given is not the same thing as grace received, and definitely not the same thing as grace returned.

Let us go back for a moment to Bergson's essay, to the point where he rephrases Ravaisson's ideas in terms of the gift cycle:

Thus, for him who contemplates the universe with the eye of an artist, it is grace that is apprehended through the veil of beauty, and beneath grace it is goodness which shines through. Each thing manifests, in the movement recorded by its form, the infinite generosity of a principle which gives itself. And it is not by mistake that we call by the same name the charm we see in

movement, and the act of liberality characteristic of divine goodness: the two meanings of the word *grace* were identical for Ravaisson.⁶⁰

To be sure, the two meanings of grace are synonymous, not because of etymology but precisely because of what Bergson points at by using the language of gift exchange, implying the cycle is nothing but an exchange of generosity. A 'movement recorded by a form' is met by a moving form. Thus, grace cannot be reduced to its relationship with habit and must be consistently analysed as part of the gift cycle.

When we apply this model to driving a car, the question arises: Which of the two is actually moving, us or the car? We are sitting still in the driver's seat, changing the form of our bodies by moving our limbs. The car, however, is not changing its form at all but moving at high speed. Where is the actual exchange taking place? In this sense, driving a car is the opposite of riding a horse. When we ride, we become the immobile torso, and the horse acts as the limbs; in the case of driving, we are the limbs and the car the torso, in what is essentially a form of harnessing. We and the car are both built – that is, structures in the sense of Schiller's *Bau*. We both have a build inasmuch as we have been built in a certain way, with an architecture of still and mobile parts. Again and again, Schiller speaks of the 'technology of the human structure', *die Technik des menschlichen Baues*.⁶¹ Obviously, the car has been built according to our build. Our way of driving adapts to the car, and the car has been adapted to our way of driving. In terms of the gift cycle, we might have a gift for driving, so to speak, but that gift is partially substantiated by the car; the car *enables* us to drive. We drive thanks to the car, but the car does not drive itself through us; it is a gift we have to receive, and which we try to return by increase, by driving well. The Graces are 'givers of increase', as Jane Harrison said.

Critics of technology have regularly advanced the argument that as we drive we are driven, that the car defines our behaviour as much as we define its behaviour, as if the machine turns us into a machine as well. Such co-determinism is *precisely not* what gift exchange entails: the gift does not define what the receiver does with the gift; it gives in such a manner that the receiver can become a returner. Instrumentality and purposiveness are never, and never will be, able to explain the nature of technology. The gift implicitly carries a sense of the indeterminate or surplus. Certainly, while driving we have a goal in mind, and likewise while hammering or typing, but if these technologies did not allow or again, enable swerving and manoeuvring, we would never be able to find our way. And as to the word 'enable', we should note that its etymology wholly coincides with that of 'inhabit', *in habilis*. Technology – that which is built – needs to reach beyond its purpose. Or, to phrase it in the religious terms of transcendence we used earlier, the car's build exudes a halo of movement, which by expansion turns into the halo of driving. The technology of the car's *Bau* is a form of enabling – that is, of empowering, not of defining. In this sense, we do not inhabit the car when we drive; *the car inhabits us*, exactly as the gift cycle's second stage of internalisation prescribes, to then make us expand and grow. Grace exceeds every notion of instrumental use or the 'least expenditure of force', as Herbert Spencer defined grace.⁶²

The things around us – and all things are built things – do not passively await our gracious handling; there is as much generosity in them as there is in us. The movement we actualise is not just the movement stored in our own bodies by the rhythms of habituation. The gift cycle is, first and foremost, driven by the Leonardo-Schiller turn: stillness into movement (beauty), and movement into stillness (grace). In short, it will not suffice to explain the relationship between habit and grace in terms of

the early, Aristotelian Ravaisson, who was deeply influenced by the concepts of potential and actual movement. Potential movement does not simply lie stored in the darkness of our own bodies; it emanates from the things around us as well, visibly and actually, in what we have been calling a halo and what Bergson described as a 'veil of beauty', and beauty is wholly indeterminate.⁶³

Here the argument turns sharply against ergonomics: the more that things and we adapt to one another, the less movement there will be. Fully adapted to us, the car will drive itself, and we will merely sit there being passengers. The whole secret of the gift cycle lies in the fact that the figure of grace cannot be appropriated, neither by us nor by the things around us. To drive well, or better, to live well, we need between us and things a certain *gap*: a word that slowly starts to take a central position in our discussion. We and things do not – and should not – fit, for it is in the gap between habit and inhabitation that the figure appears. However, determining that gap is a most subtle affair: if there is a perfect fit, the figure disappears, but if the gap grows too large, the figure disappears as well. Somewhere there exists a middle, though not merely between us and things but also between us and our habits. The gap is a *double gap*, existing on both sides of the middle: a graceful act can neither be produced by habit's repetition nor by the things around us. This, of course, is the reason why the figure's appearance is never certain. The whole art of doing-well, of grace, is jumping the gap between habit and inhabitation.

The word 'habit' evolved from the Proto-Indo-European root *ghabh*, which means 'to give, to receive', as well as the Sanskrit *gabhasti*, meaning 'hand' or 'forearm', both of which converge in the Latin *habere*, which means 'to have, to hold, wear, etc.' The contrapuntal ambiguity of having and giving expresses how habit and grace are firmly

rooted in the gift cycle – logically, since the cycle itself is based on the ambiguity of a property that is owned and a gift that is dispensed. If it were only owned, it could not be shared; if it were purely given away, it would never be returned. Ambiguity causes the gift to be returned, although, as mentioned before, the return of the gift makes ‘ambiguity’ the wrong term, since grace does not involve some passive, linguistic state of vagueness, contradiction or paradox but rather an active turn in need of being worked out, both in the present and as present. Giving means being given; handling means being handed. It is indeed, as Ravaissou says ‘a law, a *law of the limbs*, which follows on from the freedom of spirit. But this law is a *law of grace*.’⁶⁴ And this can only be true because the law of the limbs is the law of the gift cycle, of the Graces. The law of the limbs is by no means a law of an established form of ease or a formalisation of ease, of what the French would call *souplesse* and the Germans *Gelenkigkeit*, since you neither fully have it nor is it fully given to you.⁶⁵ If it were given in advance, it would erode into *comfort*, the dream of ergonomics, which would make the whole cycle irrelevant. Again, technology reveals its deeply religious vocation; relieving us from burden and providing us with such ease of movement we can hardly distinguish between the religious comfort of solace and the technological comfort of appliances. But each works only when it stops short and acknowledges the necessity of the gap. Given too much comfort, we might as well disappear altogether. If, on the other hand, we were to claim grace as our property, as something we had and controlled as our own, it would degrade into *slickness* or virtuosity. Ease does not sprout from easiness: *ease sprouts from difficulty*. This is the law of the limbs, which is also the rule of counterpoint that lies at the heart of the Leonardo-Schiller turn.

Grace and play

At the very beginning of our essay, the notion of counterpoint led us to posit that play means we

must act seriously, and that to do our duty we should act as if we were playing. These remarks contain a few words that have been used increasingly often throughout our argument and should now be given our full attention: ‘play’, ‘act’, ‘act like’, and ‘as if’.

What kind of play does this involve? Again, many clues are given by Schiller – someone at least as interested in freedom, grace and education as Ravaissou – the idea of play is central to his *On the Aesthetic Education of Man*. Initially borrowing it from Kant’s remarks on the ‘free play of the imagination’,⁶⁶ he slowly transformed it into the ‘play drive’,⁶⁷ *Spieltrieb*, which is as much driven by the *Bau* of the body as by the mind’s urge for freedom:

Freedom now rules beauty. Nature provided beauty of form [*Bau*], the soul provides the beauty of play. Now we also know what grace is. Grace is beauty of form under freedom’s influence, the beauty of those appearances that the person determines.⁶⁸

Schiller does not mistake grace for freedom. On the contrary, grace is the equation of frame and freedom, and that can only be solved via the contrapuntal figure, which fundamentally determines that freedom is to be found only under strict conditions, yet necessarily strict in the most abstract sense, as if the *Bau* could be schematised, similar to the ghosted presence of the vertical axis in contraposto. Evidently, if the strictness were concrete, it would not be able to generate freedom and spontaneity. Every architect knows we cannot build freedom, though the opposite is just as true: freedom cannot be found in the unobstructed absence of structure. How to solve this? Only by ghosting the frame. Play cannot exist without the ghosted frame, and when we look at the playing of games in sports, of roles in customs, or of parts in the theatre, we see this confirmed in many ways. Strict rules define the game, and sharply defined limits define the playing field. Yet these limits are painted on the ground in the form of dashed or continuous lines, and never

materialised by walls or fences. Limits are real but abstract, and at the same time strict but open, and more part of a world of rules than of laws, as Baudrillard would put it.⁶⁹

Since turns and counterpoints fundamentally govern the playing of games, roles, and parts, play must rely on habit as well as being embedded in the machinery of grace. To properly understand how the different varieties of sport, custom, and theatre relate to our research into grace, habit and inhabitation, we will surely need more than this essay. For now, however, to complete our sketch of the grace machine, we should look into a few of their aspects.

In sports, we easily find dozens of connections to grace, habit and even *charis* – the references in Pindar's *Olympian Odes* to the *charis* of athletes are numerous. Everything seems connected to our discussion of grace and habit: the relentless practicing of moves during training, the admiration brought on by striving, the searching for ease without strain, the grace of the figures with respect to posture, the uncertainty whether things will work out in the actual game, and the shining of the winners. Though habit concerns ordinary activity and training extraordinary activity, we should consider the two continuous and based on the same principles. Training in sports evolved from military drill, and some sports still show direct links to a military past, such as the javelin throw, boxing, judo and archery. In its relation to habituation, training is comparable to acquiring customs in social roles, and to rehearsing a part for the stage. We should keep in mind that customs are akin to costumes; we can put them on and take them off, in exactly the way Venus used the girdle of the Graces, according to Schiller.⁷⁰ Training requires enormous effort and the meticulous control of actions, which are without exception based on imitation, whether it concerns roles in the theatre or the social roles of customs. The fact that mimesis is one of the mechanisms in the complex machinery gives us a clear hint that habit is not merely a matter

of us and our bodily structures. Even when focusing on ourselves, as athletes often do, we imitate models and imagine opponents. Along with military drill, athletic training is the most extreme form of habituation we know, with its endless repetition of every movement, the constant attempts to improve, the difficulties and injuries to overcome, the stamina and extreme effort needed to persevere. One might think sports training and military drill would be the last places one should expect to encounter grace, but in ancient Greece – where else? – military exercise was viewed as a powerful source of *charis*. Herodotus reports on a scout spying on the Spartan army: 'He saw some of the men exercising naked and others combing their hair. He marvelled at the sight and took note of their numbers. When he had observed it all he rode back ... and told Xerxes all that he had seen.'⁷¹

Naked exercising is one thing, but soldiers collectively combing their hair just before a deadly battle? It sounds as if the Spartans had the perfect understanding of beauty. Beauty and grace play a central, yet covert, role in sports as well. As David Foster Wallace observed in his celebrated article on tennis player Roger Federer, 'Of course, in men's sports no one ever talks about beauty or grace or the body.'⁷² Yet grace is undeniably part of it, as the celebrated author shows in the following segment of the same article, in which he ponders the roles of movement, feeling, training, and consciousness. Reading Wallace on tennis is like checking off items on a list of aspects of habit and grace drawn up by Ravaisson:

Successfully returning a hard-served tennis ball requires what's sometimes called "the kinesthetic sense," meaning the ability to control the body and its artificial extensions through complex and very quick systems of tasks. English has a whole cloud of terms for various parts of this ability: feel, touch, form, proprioception, coordination, hand-eye coordination, kinesthesia, grace, control, reflexes, and so on.

For promising junior players, refining the kinesthetic sense is the main goal of the extreme daily practice regimens we often hear about. The training here is both muscular and neurological. Hitting thousands of strokes, day after day, develops the ability to do by “feel” what cannot be done by regular conscious thought. Repetitive practice like this often looks tedious or even cruel to an outsider, but the outsider can’t feel what’s going on inside the player – tiny adjustments, over and over, and a sense of each change’s effects that gets more and more acute even as it recedes from normal consciousness.⁷³

There must be innumerable reasons why the world of sports has become our chief source of figures of grace, having taken over this role from the arts, and sculpture in particular. Just thinking of the top four sculptures of all time – the *Laocoön*, Cellini’s *Perseus*, Canova’s *Three Graces*, and Rodin’s *Balzac* – we realise that absolutely nothing today reminds us of such postural art, *except sports*. One of the reasons might be that sports in fact co-emerged with technology; the two seem like conjoined twins. Another reason might be the arts’ constant suffering under the metaphysical division of appearance and reality. In the arts, mimesis remains a hopelessly unresolved issue, while in sports, it is simply embedded in the mechanism of finding grace. In sports – as in custom, theatre and fashion – mimesis belongs to the domain of the real, not of illusion. Mimesis is wholly part of the ontological machinery of figuration, wherever it occurs, stabilising the turning wheel of habit and training.

When Federer hits his forehand or a football player makes an incredible move, when a volleyball player hits a smash or a high jumper throws his back over the bar, when an alpine skier performs a slalom or Valentino Rossi takes a bend on his motorcycle – lying on his bike like a huge frog – or when a diver jumps off the springboard, a gymnast performs a somersault, a boxer strikes a right blow, a skater does a pirouette, or a judoka makes a back throw,

these movements are without question real because they are graceful, and graceful because they are figural. Sports continuously supplies us with thousands and thousands of figures. The fact that these movements have the status of figures – and in our terminology, that means they act as objects – can be seen in a wide range of different phenomena. The most intriguing demonstration of this effect can be observed in the obsessive live replays during games and races on television that seem to grind time to a halt. We can see it even more clearly in the slow-motion replays of the most figural actions. No question that slow motion is one of the most original inventions in the world of technical imagery. Slow motion literally shows movement turning into stillness, and in that turn we recognise grace, not in either one separately. It is like seeing Keats’s slow time converge onto an object instead of emanating from it. Mere freeze-framing would fail to present us with the figure. Not one of these figural moves is certain; an athlete may train for a specific move and never find a way to use it, and he or she may come up with a completely new move during a game.

The fact that play, movement, training and grace occur in such an intricate web of workings becomes even more apparent in the lengthy argument of Plato’s *Laws*, the book that was so important to Schiller as he was writing ‘On Grace and Dignity’. Perhaps because it was the Greek philosopher’s last book, it seems to have been written by a thinker who has mellowed slightly. Having come out as the sworn enemy of mimesis in *The Republic*, in which he noted how essential imitation was in military training,⁷⁴ Plato now arrives at the view that dance is a necessary core activity within education (*paideia*) and essential to the successful building of any city-state. Schiller based both ‘On Grace and Dignity’ and *On the Aesthetic Education of Man* on the similar assumption that moral rectitude may be accompanied by aesthetic pleasure, especially in the context of education. There is a long section in the *Laws* in which Plato explains how the Athenians

teach rhythmic movement to their children 'as by a tonic, when they are moved by any kind of shaking or motion, whether they are moved by their own action – as in a swing or in a rowing-boat – or are carried along on horseback or by any other rapidly moving bodies'.⁷⁵ Rocking babies as part of teaching the law of the limbs! Motion administered 'as by a tonic'! Rhythm is 'taken in', absorbed, or – as we put it earlier when discussing Euphrosyne – swallowed, and returned beyond its sphere, in the realm of Thalia, as bloom and growth, or, in Plato's words, in a child's upbringing. This leads Plato to advocate a structured programme of training citizens through a set of dance routines that differ for each age group. And Plato goes further, especially with respect to *paideia* (play) and its connection to *choros* (dance):

It is the life of peace that everyone should live as much and as well as he can. What then is the right way? We should live out our lives playing at certain pastimes – sacrificing, singing and dancing – so as to be able to win Heaven's favor and to repel our foes and vanquish them in fight.⁷⁶

'Live as well as he can' – practically the first sentence of our essay. For the older Plato, dance, grace, training, education, and the appreciation of laws are so interconnected that he permits himself a wordplay on *choros* and *charis*⁷⁷ and even relates joy to mimesis.⁷⁸ Perhaps Kant, who stated that 'imitation has no place in morality', should have studied the Greek philosopher more thoroughly.⁷⁹ In this sense, Plato's ideas even go beyond Schiller's and Ravaillon's, because the coupling of moral stance and aesthetic pleasure, viewed in the framework of *charis*, becomes a cyclical argument. Plato's advocacy of collective dancing – during festivals that recur every two weeks, no less – would make it an activity shared by the whole community, doubtless inspired by the dancing Graces.

With the complex affinities between the various concepts of grace, *charis*, habit, training, play, and

mimesis, we have slowly developed a clearer picture of how the machine of grace is constructed, and before we tie up the argument, we should redirect it toward the larger issue of habit and inhabitation, the two poles of the machine. By looking at dance, art, sports, and play, we have enhanced our understanding of the path between habit and grace, the temporal pole of the machine. We have seen how the route from grace to habit, backwards in time toward memory, is assured by training and incorporation. We have also seen that the path forward in time, that of the production of grace out of habit, is not assured, and in this sense, the distance between habit and grace is part of the larger gap between habit and inhabitation.

But we have only occasionally been able to elaborate on the spatial side of the gap. Looking at sports has shown us that space itself contains such a gap. Indeed, *space is broken*, or, if you will, polarised. What we have called the pole of inhabitation is itself split in two. Sports, because of its intrinsic reliance on figuration, thrives on this dichotomy and takes place in the most radical manifestation of the gap possible, between pure field and pure object. In no way do the two fit together. Games are played on highly schematised fields, abstract surfaces we encounter in every type of game: boards, tracks, courses, arenas, pools, rinks, rings – surfaces that are geometrically divided by lines to create boxes, halves, bands, circles, corners, squares. A simplified geometry is inscribed on a highly abstract, smooth surface, not altogether different from the extreme abstraction of the highway's asphalt and striping. Invariably, these are surfaces of speed, rhythm and movement; there hardly exist more radical examples of space taking on the properties of a drawing or diagram. They are even more abstract than plans, and more like schemes. Still, the field is just one half of what defines the realm of games. The other half consists of its antipode, namely concrete objects: sticks, bats, bows, hurdles; vehicles such as boats, cars, and motorbikes; and of course dozens of

types of balls: big, small, hard, soft, perfectly round, round and flat, and not quite round. Nothing tells the ball where to go on the field, except figuration. The figures we encounter in sports should be consistently examined as bridging-jumping between abstract surfaces and concrete objects.

This complex machinery of grace, of which sports is merely the most radical form, structures nothing less than our whole lives (and, I would add, those of all other things, but let us leave that for now). We cannot inhabit space directly with our habits. Undeniably, an enormous danger for architects, designers and engineers lurks in the idea that we can. Habit and inhabitation do not fit together like a hand and a glove; they are necessarily separated by a gap, a double gap with two sides: a horizontal, temporal side that ejects figures of grace that can only appear on the other, spatial side of the gap, itself structured as a vertical gap between abstract, smooth fields and concrete, contoured objects. Oddly enough, all the parts of what we have called the grace machine can be clearly defined and described – the wheel of habit and training; the rhythms it produces being spatially reflected in the abstract field; the existence of concrete objects, lifted from the field over the vertical axis of gravity – *but not grace itself*. Being wholly dependent on workings, it can never be assured of whether the machine works. Indeed, this radical uncertainty is the whole reason for its existence; it is a machine with a fundamental question mark at its heart.

Notes

1. For the monotheistic version, see the Old Testament, in which the Hebrew word for grace, the good and the beautiful is *chēn*. Generally it is translated as finding 'grace in the sight of the Lord'. Strong's definition: '*chēn, khane*; from H2603; graciousness, i.e. subjective (kindness, favor) or objective (beauty): – favour, grace(-ious), pleasant, precious, (well-)favoured'.
2. Usually ascribed to Epicurus. Cf. Erkinger Schwarzenberger, *Die Grazien* (Bonn: Habelt Verlag, 1966), 58.
3. Marcel Mauss, *The Gift: The Form and Reason for Exchange in Archaic Societies*, trans. W.D. Halls (London: Routledge, 1990), 3.
4. *Ibid.*, vii, 16–18.
5. *Ibid.*, 43.
6. *Ibid.*, 14. And: Marshall Sahlins, *Stone Age Economics* (New York: De Gruyter, 1972), Chapter 7, 'The Spirit of the Gift', 149–84.
7. Claude Lévi-Strauss, *Introduction to the Work of Marcel Mauss*, as quoted in Sahlins, *Stone Age Economics*, 154: 'Are we not dealing with a mystification?' And: Jacques Derrida, *Given Time: 1. Counterfeit Money*, trans. Peggy Kamuf (Chicago: University of Chicago Press, 1994), 10: 'Why and how can I think that the gift is impossible?' Derrida argues that the notion of excess excludes the possibility of return. Mauss's argument, in stark contrast, is precisely that the return is enabled because of surplus, which is the whole reason why we cannot reduce it to mere economy.
8. Sahlins, *Stone Age Economics*, 191–96. And: Marcel Hénaff, *The Price of Truth: Gift, Money, and Philosophy*, trans. J.-L. Morhange (Stanford, CA: Stanford University Press, 2010), 248.
9. See, for instance: Nurit Bird-David, "Animism" Revisited: Personhood, Environment, and Relational Epistemology', *Current Anthropology* 40, no. 1 (February 1999), 67–91.
10. *Iliad* 9.315–17.
11. *Odyssey* 1.60–62.
12. *Odyssey* 23.174–80.
13. *Iliad* 14.182–83.
14. *Odyssey* 23.158.
15. See: Bonnie MacLachlan, *The Age of Grace* (Princeton, NJ: Princeton University Press, 1993).
16. I introduce the term 'superactual' in: 'Charis and Radiance', *Giving and Taking: Antidotes to a Culture of Greed*, ed. J. Brouwer and S. van Tuinen (Rotterdam: V2_Publishing, 2014), 136–47.
17. Mauss, *The Gift*, 39–43.
18. *Ibid.*, 3.
19. *Iliad* 18.382.

20. *Odyssey* 18.193–94.
21. *Theogony* 910.
22. Pausanias 9.35.1
23. Barbara Breitenberger, *Aphrodite and Eros: The Development of Erotic Mythology in Early Greek Poetry and Cult* (London: Routledge, 2007), 107.
24. Seneca, *On Benefits*, Book I, part III.
25. Lars Spuybroek 'Sun and Lightning', in: *The War of Appearances: Transparency, Opacity, Radiance*, ed. J. Brouwer, S. van Tuinen and L. Spuybroek (Rotterdam: V2_Publishing, 2016), 103.
26. Jane Ellen Harrison, *Prolegomena to the Study of Greek Religion* (Princeton, NJ: Princeton University Press, 1991 [1903]), 438, 444.
27. Schwarzenberger, *Die Grazien*, 46.
28. In various coins, vase paintings and reliefs, this is the main technique used to represent their circular configuration on a flat surface. See: Schwarzenberger, *Die Grazien*, Tafel 1–12.
29. Seneca, *On Benefits*, Book I, part III.
30. Jane Harrison, *Prolegomena*, 286.
31. Carl Kerényi, *Gods of the Greeks* (London: Thames & Hudson, 2008), 101.
32. *Iliad* 5.338.
33. *Odyssey* 8.364.
34. Friedrich Schiller, 'On Grace and Dignity', trans. Jane Curran, in: *Schiller's 'On Grace and Dignity' in Its Cultural Context*, ed. Jane Curran and Christophe Fricker (Rochester, NY: Camden House, 2005), 123–24.
35. *Ibid.*, 125.
36. Edmund Burke, *A Philosophical Enquiry into the Origin of our Ideas of the Sublime and Beautiful* (Oxford: Oxford University Press, 1998), 109.
37. Paul Souriau, *The Aesthetics of Movement*, trans. Manon Souriau (Amherst, MA: University of Massachusetts Press, 1983), Chapter 10, 'Grace and Ease of Movement', 81–96; Herbert Spencer, *Essays: Moral, Political and Aesthetic* (New York: Appleton and Co., 1865), Chapter XIII, 'Gracefulness', 312–18.
38. Schiller, 'On Grace and Dignity', 128/176: 'die architektonische Schönheit des menschlichen Baues'.
39. Henri Bergson, *Creative Mind: An Introduction to Metaphysics* (Mineola, NY: Dover Publications, 2007), 207. See note 43.
40. Spuybroek, 'Charis and Radiance', 136–47.
41. Jean-Pierre Vernant, *Mythe et pensée chez les Grecs: Études de psychologie historique* (1965): 'To the Greek, the *charis* does not only emanate from a woman's body, or from any human being who "shines" with the beauty of youth, with a sparkle (often found in the eyes) that inspires love; it also emanates from finely chiselled jewellery, carefully carved jewels, and from certain precious fabrics; from the scintillation of metal, the bright reflection of a precious stone's water, the polychrome quality of a weaving, and the vivid colours of the depiction of an animal or a vegetal setting with an intense liveliness. The silversmith's and the weaver's works also shine splendidly and render the gleam and light of flesh.' Quoted in Denis Vidal, 'The Three Graces, or the Allegory of the Gift', in *Hau Journal of Ethnographic Theory* 4 no. 2 (2014): 339–368.
42. Bergson, *Creative Mind*, 207. Funnily, this quote cannot be found in Leonardo's *Trattato della pittura*. Bergson's remark comes from his essay on 'The Life and Work of Ravaisson', and he seems to be quoting from the work of the nineteenth-century French philosopher. However, the exact quote cannot be found there either. The closest is: 'Forms are beautiful, but movement possesses grace ... If it is possible to consider forms (as often happens in geometry) as the durable vestiges of movements, as *immobilized movements*, one can equally say, it seems, that *beauty is akin to the once mobile grace that has become fixed* (emphasis added). At this point in the text, Ravaisson is not yet discussing the work of Leonardo; he does so in the paragraphs that follow. See: Félix Ravaisson, *Selected Essays*, trans. Mark Sinclair (London: Bloomsbury, 2016), 178.
43. Leonardo da Vinci, 'On Painting', in: *The Literary Works of Leonardo da Vinci*, trans. Jean-Paul Richter (London: Samson Low, Marston, Searle & Rivington, 1883), par. 592 on p. 295.
44. *Ibid.*, par. 48 on p. 29.
45. *Ibid.*, par. 591 on p. 295.

46. William Hogarth, *The Analysis of Beauty*, ed. Ronald Paulson (New Haven, CT: Yale University Press, 1997), 51.
47. Gian Paolo Lomazzo, *Trattato*, quoted in John Shearman, *Mannerism* (Penguin Books, 1967), 81.
48. Walter Pater, *The Renaissance: Studies in Art and Poetry*, ed. Donald Hill (Berkeley: University of California Press, 1980), 48.
49. Cf. Kenneth Clark, *Civilisation: A Personal View* (New York: Harper & Row, 1969), 107. An allusion to the Cluny 'millefleurs' tapestries that, though dated later than Botticelli's *Primavera*, are generally considered to be late medieval, especially the series of six in Cluny entitled 'La Vie Seigneuriale'.
50. Ravaissou, *Selected Essays*, 178.
51. Pierre Hadot, *The Veil of Isis: An Essay on the History of the Idea of Nature*, trans. Michael Chase (Cambridge, MA: Belknap Press, 2006), 222.
52. Pierre Hadot, *Plotinus, or the Simplicity of Vision*, trans. Michael Chase (Chicago: University of Chicago Press, 1998), 50.
53. Félix Ravaissou, *Of Habit*, trans. Clare Carlisle and Mark Sinclair (London: Continuum, 2008), 71.
54. Gregory Curtis, *Disarmed: The Story of the Venus de Milo* (New York: Vintage Books, 2003), 96–121.
55. Ravaissou, *Selected Essays*, 178.
56. I would define Michelangelo's use of the S-figure as (early) Baroque, a realm that only allows for figuration because it is prestructured (the reason why his figures take on the traits of the colossal), while Leonardo's is (late) Gothic, a world where weak limbs configure into a strong, rigid network. For further discussion of the differences between Baroque and Gothic, see Lars Spuybroek, *The Sympathy of Things* (London: Bloomsbury, 2016), 24–27 and 44–45.
57. Ravaissou, *Selected Essays*, 260: 'Grace, which is all suppleness and flexibility, and thus as different as could be from geometrical rigidity'.
58. Ravaissou, *Of Habit*, 59: 'Yet by its repeated or prolonged exercise, we learn to adjust the quantity of effort, and to choose its point of application, in relation to the end that we wish to attain; at the same time, *the consciousness of effort is effaced*' (emphasis added).
59. This is what Ravaissou calls the 'double law' of habit (*Of Habit*, 37), explained by Catherine Malabou in her foreword to the English translation as the 'repetition [that] weakens sensibility and excites the power of movement'. See also: Clare Carlisle, *On Habit* (London: Routledge, 2014), 27–31.
60. Bergson, *Creative Mind*, 208.
61. Schiller, 'On Grace and Dignity', 177.
62. Spencer, *Essays*, 313.
63. Cf. Spuybroek, 'Charis and Radiance', 136–39.
64. Ravaissou, *Of Habit*, 57.
65. This would also be my critique of explaining Ravaissou's connecting habit to grace in terms of an exercise of bodily 'plasticity', as Catherine Malabou does in her foreword to *Of Habit*. Clare Carlisle adopts the principle in *On Habit* (21–24.) When grace is as much *of* as *beyond* the body, a (neo-)materialist notion such as plasticity or elasticity can never explain its structure. Grace is structured by a cycle that includes both horizontal immanence and vertical transcendence, a verticality that by definition cannot solely 'emerge' from the plane of immanence.
66. Immanuel Kant, *Critique of Judgment*, §51: 'The Division of the Fine Arts'.
67. Friedrich Schiller, *On the Aesthetic Education of Man in a Series of Letters*, trans. E. Wilkinson and L. Willoughby (Oxford: Clarendon Press, 1967), Letter XV.
68. Schiller, 'On Grace and Dignity', 133–34.
69. Jean Baudrillard, *De la séduction* (Paris: Éditions Galilée, 1979), 'La passion de la règle', 179–208.
70. Schiller, 'On Grace and Dignity', 124.
71. Herodotus, *The Histories* 7.208.3.
72. David Foster Wallace, 'Roger Federer as Religious Experience', *The New York Times*, August 20, 2006.
73. Ibid.
74. Plato, *Republic* 3.395b–c.
75. Plato, *Laws* 7.789.
76. Plato, *Laws* 7.803. See also: Johan Huizinga, *Homo Ludens: A Study of the Play Element in Culture* (Boston: Beacon Press, 1955), 18–19.
77. Plato, *Laws* 2.654a.
78. Plato, *Laws* 2.668.

79. Immanuel Kant, *Groundwork of the Metaphysics of Morals*, trans. Mary Gregor (Cambridge: Cambridge University Press, 1996), 46: 'Nachahmung findet im Sittlichen gar nicht statt'.

Biography

Lars Spuybroek is Professor of Architecture at the Georgia Institute of Technology in Atlanta where he teaches design methodology and aesthetic theory. He is the author of among others *The Architecture of Continuity* (2008), *Research and Design: The Architecture of Variation* (2009), *Research and Design: Textile Tectonics* (2011), and *The Sympathy of Things: Ruskin and the Ecology of Design* (2011 and 2016). Spuybroek is currently working on a book titled *The Grace Machine: Architectures of the Figure* (London: Bloomsbury, 2019).

The Diagrammatic Inquiry of Architectural Media

Peter Bertram

In architectural discourse the diagram is typically a simplified drawing. It enables the architect to focus on a specific set of parameters. It can be a simplified version of an image but it can also be without resemblance to the object under consideration. The latter depends on a notation system. The diagram is distinguished from the conventional architectural image. The image relates to the building though geometric conventions such as projective geometry. There is typically a proportional relationship between the drawing and the object. The architectural image depends on the precision with which it can be projected from a two-dimensional drawing to a three-dimensional object. It cannot be simplified without losing important elements of the project at hand.

The description above mentions an intermediary type of drawing both simplified and visually alike to the object under consideration. It suggests that the division between diagram and image is not without problems if pursued too rigidly. It suggests that the relationship is more complex. The main question of this article is how appropriate concepts can be developed to understand the interval and how the conception of the relationship can escape the division.

I problematise the division with reference to the philosopher C.S. Peirce's diagram. The Peircian diagram is a map of relations crucial to an open-ended inquiry of a given problem. I use it to frame the

discussion and focus on the relationship between an individual and an architectural medium in the course of an exploratory architectural process.

I propose a distinction between a digital diagram and a motif. The digital diagram uses a notation system. It can be reproduced with no loss. All copies are true copies of the original diagram. The motif is a non-representational mode of distribution. It is inseparable from the materiality of the medium and the specificity of the particular drawing. It does not use a notation system and cannot be reproduced without changing the way it is understood. The motif is discussed at some length because it transgresses the conventional understanding of the architectural diagram.

I avoid constructing a linearity between old and new media in terms of relevance. I begin with a discussion of the traditional architectural sketch. In the last section, the argument is extended beyond traditional media and the architectural image. I discuss a technical environment comprised of many different media including architectural models. The current field of architectural media is potentially quite heterogeneous comprised of both traditional sketches and contemporary technologies.

I conceive of the text as the beginning of a more detailed map. The concept of the diagram offers possibilities to extend the inquiry far beyond the framework of this article.

The useful icon

Architectural theorist Anthony Vidler discusses the role of diagrams in architectural practice in the essay *What is a Diagram Anyway?* He refers explicitly to Peirce's diagram. The Peircian diagram is a useful icon. It strips the issue from irrelevant details allowing consciousness to concentrate on the central problem. It is a skeleton-like sketch of the most important elements under consideration. The abstraction allows for variation and manipulation of the diagrammatic parts thus serving as an aid in reflecting upon the problem at hand. It is a mental map.¹

The useful icon has a suggestive 'utopian' nature that helps to advance investigation.² It is not involved in consolidating knowledge but concerned with the production of new insights. The diagrammatic inquiry is open-ended. It supports Peirce's well-known motto: 'Do not block the Way of Inquiry!' Peirce states that the motto is the first rule of reason to be inscribed on every wall in the city of philosophy.³

Given the visually abstract nature of most diagrams it might be surprising that it falls into the category of the icon in Peirce's classification of signs: the symbol, the index and the icon. However, the icon as diagram is not a matter of visual resemblance. The relation of the diagram to its 'object' is one of operational likeness. It is a whole consisting of interrelated parts subject to experimentation. It is assumed to operate in a manner similar to another whole of interrelated parts.⁴

It might be true to the philosopher and/or mathematician that the diagram could be drawn on any sheet of paper but to the architect the choice of medium is paramount. Vidler establishes a connection between the skeleton driving philosophical thought and the way reflection takes place in architectural media. I intend to follow the suggestion further and relocate the concept from the abstract

and simplified set of lines of philosophical thought to architectural media. I will address notational, mimetic and material aspects of the media.

Performing such a transfer is not necessarily an easy matter and the obvious danger is that fundamentally different concepts and modes of thinking are conflated too hastily. The problems investigated by philosophy are not simply the same as the ones investigated by architectural reflection nor are they treated in the same manner. Therefore, Peirce's diagram is not simply applied to architectural media. Rather, it is used to establish general conditions for the diagrammatic inquiry. In order to approach the specific nature of the diagrammatic 'objects' of architectural media other diagrams are introduced. Especially the role of the materiality and the situated nature of architectural media are taken into consideration.

It is noteworthy that the concept of the diagram changes over the course of Peirce's career. I will not attempt to trace the concept through a survey of the original texts; that would go far beyond the framework and subject of this article. I relate first and foremost to a specific interpretation. In *Diagrammatology*, semiotician Frederik Stjernfeldt offers a thorough scrutiny of the concept impinging on the problem suggested above. The book discusses diagrammatic reasoning in relation to various diagrammatic objects. According to Stjernfeldt the diagram is often clothed in something else, for instance, an image. Even the most naturalistic of paintings can be treated as a diagram the instant you stop considering its colours and forms and direct attention towards the relation between its parts.⁵

The diagram is only a sign 'in actu'. In other words, it must be used as a sign. It is only a diagram if it is used as a diagram. If I look at a painting in a distracted manner it may be an image in a simple sense of the words. However, the instant I start to

investigate the painting more closely, it is operated upon as a diagram. I might relate depicted persons to each other and speculate on their intentions. I might relate them to the spaces in which they are placed, to the shape of their faces, the colours of their clothes and reflect on the meaning of the differences. In doing so, I am performing a diagrammatic operation.

If the concept of the diagram discussed so far suggests that highly simplified images and abstract notations constitute the proper diagrammatic architectural media, Stjernfeldt offers another possibility. If a painting can be treated as a diagram so can the building-image characteristic of traditional architectural drawings and mainstream architectural media. The jump from mimetic representation to diagram occurs the second you stop treating the architectural image only as a visual representation and query a selected set of relations.

Figure 1 shows an architectural sketch by architect Poul Ingemann during the development of a building proposal. It belongs to a series of drawings exploring the potential of different symmetrical figures. The formal considerations are connected to different aspects such as functional requirements, tectonic principles, spatial possibilities and so on. None of these are necessarily represented directly in the sketch and would most probably not be detected by non-architects. In other words, the sketch is used as a mental map by the architect to reflect on different issues that go far beyond formal considerations.

The Ingemann example suggests a problematisation of the distinction between architectural image and non-mimetic notation. It implies that the traditional sketch can function as a diagram. However, it is not sufficient to establish that many forms of architectural drawing can be termed diagrams. What is really called for is a distinction between different architectural diagrams.

The impure medium

According to architectural theorist and architect Stan Allen architectural drawing is an impure mixture of image and notation.⁶ He favours notation over mimesis because it is better equipped to handle complex phenomena such as contemporary urban conditions. Notation enables the architect to map complex and volatile phenomena and develop strategies to influence a given context. In comparison, the artifact seems like an inert island unable to negotiate a dynamic context. He summarises the notational properties under the term digital diagram.

It is important to stress that the digital is not a property of computers. It is conditioned by a system of digits and discrete intervals. Digits facilitate computation. Computation is fundamentally a processing of information, not a faculty restricted to the computer. The digital diagram employs a notation system using a well-defined set of symbols understood by the different users of the drawing.⁷ It can organise and communicate a set of instructions for actions undertaken in another space than that of the drawing. The digital diagram supports the possibility for diagrammatic reasoning because it enables the maker to engage complex and dynamic phenomena.⁸ In other words, it meets the requirements of simplification and manipulability stated earlier.

Philosopher Nelson Goodman distinguishes between different languages of art.⁹ He uses the term allographic to identify art forms that use a notation system. The notation system is a coherent set of well-defined symbols that allows the work to be reproduced indefinitely as long as the rules of the system and the sequence of the characters are not disturbed. A sheet of music or a book are obvious examples. He uses the terms autographic to identify art forms that cannot be copied without a fundamental change in the understanding of the work. It is not the presence of an author that determines the autographical art form but the fact that it is not made

to be copied. An oil painting is emblematic of the latter category.

Architectural media occupy either side of the distinction. Some are allographic, some are autographic and many combine characteristics of both. The placement often depends on the particular situation.¹⁰ Allen leaves the mimetic nature and the material characteristics of architectural media behind in order to validate his own and kindred architectural practices of notation and mapping. His argument is informed by Goodman's idea that art develops towards higher forms of abstraction.¹¹ However relevant many of Allen's points may be, my ambition is to free the distinction from the normative perspective of a specific architectural practice and question if material 'impurity' is simply a residue of an older and somewhat obsolete form of drawing. My point of view is that the role of mimetic and material impurity in the apparatus of drawing is not understood properly if the aim is to choose and favour one side over the other.

Figure 2 exemplifies a conventional architectural drawing. It uses a notation system developed for architectural drawing. It uses numbers to indicate distance and abstract symbols such as arrows to indicate the orientation of the stairs. The letters of the alphabet are abstract symbols too explaining the meaning of various signatures or delivering information about the drawing.¹² The drawing is a simple version of the digital diagram.

The drawing consists of elaborate geometric figures representing different components and spatial divisions. The translation of this part of the drawing depends on projective geometry and proportional scale. The different parts of the image, the walls, the stairs, the windows etc. are developed in relation to a set of issues concerning light, vision, construction, accessibility and so on. From this perspective, the image is a skeleton of relations

explored by drawing in a so-called conventional mimetic manner.

The drawing can be said to follow standard conventions of contemporary architectural drawings. It is not possible to judge exactly the extent to which the architect has perceived the drawing as a composition of volumes, figures and lines. However, the drawing is a late version of a sequence of drawings made to develop the project. The interplay between volumes and landscape suggests an earlier exploratory phase. In any case, the drawing is an independent map of relations captured in a specific medium. It exists in its own right on the surface of the drawing no matter how the building is realised.

The term composition echoes a painterly aspect of the drawing according to which the thing under question is not only the space of the building. It may be that the drawing meant to communicate information needed for construction tends to erase the traces of its making but in the earlier phases of a process an architectural drawing can be developed as a non-representational composition without knowing exactly how it complies to the logic of building. This process is not simply 'free' or 'intuitive'. It explores architectural space by other means than representation. It is often preoccupied with investigating the fundamental problem of the work. One simply has to recall the architect Louis Kahn's composition of the unbuilt Dominican Motherhouse and the way the collage of architectural figures on tracing paper envisions a community of people.¹³ It exemplifies how a standard material in architectural practice, tracing paper, is treated through the use of an artistic technique in order to contemplate what an assemblage of people might be.

The motif as diagram

The example above and the reference to Kahn have suggested the diagrammatic potential of

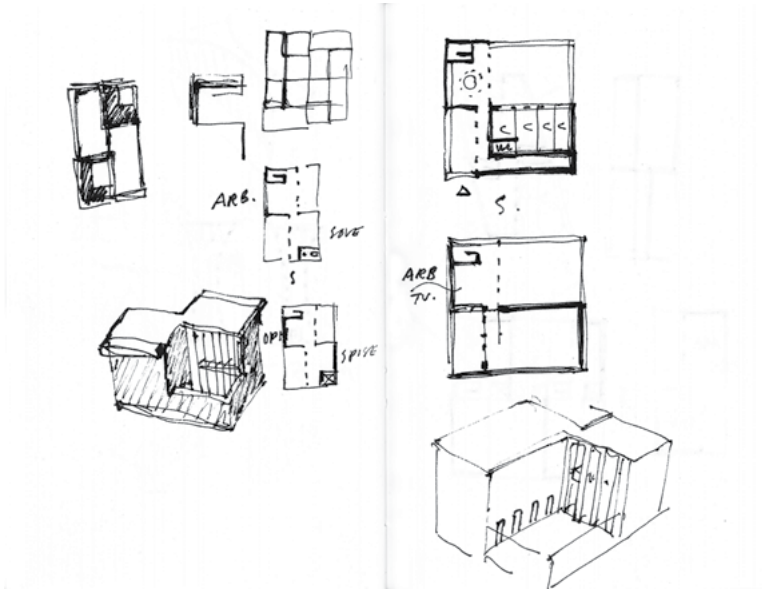


Fig. 1

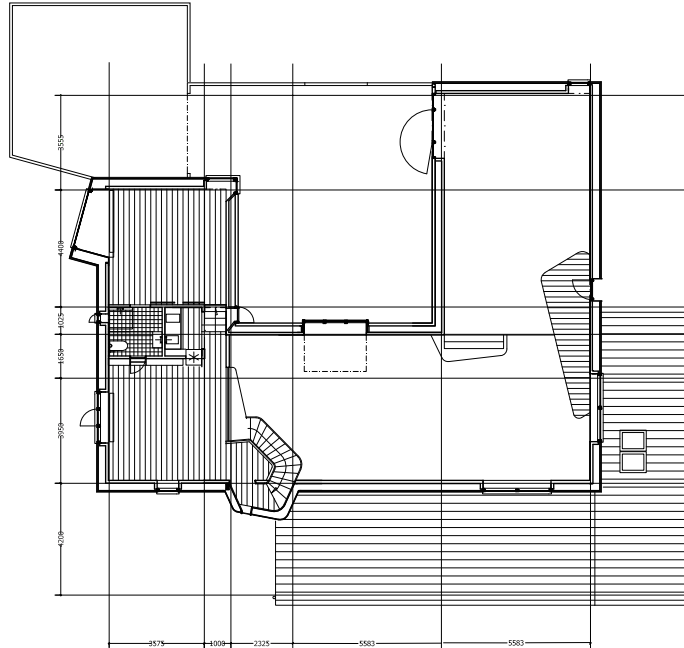


Fig. 2

Fig. 1: A sketch by Poul Ingemann. Courtesy of the architect.

Fig. 2: Plan of a painter's studio in Jutland, Denmark, designed by Merete Lind Mikkelsen and constructed in 2015. Courtesy of the architect.

composition. In the following, the meaning of the term composition in relation to architectural media is discussed further. The discussion is informed by the motif as diagram presented by philosopher Gilles Deleuze in his *Francis Bacon, the logic of sensation*.¹⁴

Contrary to conventional use, the motif as diagram signifies a non-representational element of painting. It is the way the components of a painting are distributed without reference to another object. As a consequence, the motif as diagram is not the 'thing' represented by painting nor is it a personal idea governing the process.

It belongs to a greater family of virtual diagrams developed by Deleuze throughout his work. They operate in the interval between the virtual and the actual. The distinction between the virtual and the actual is opposed to the distinction between the possible and the real. The virtual is real, the possible is not. The virtual is actualised, the possible is realised. The real is but the sterile copy of the possible. The process of realisation simply provides the possible with a flesh. In contrast, there is no similarity between the virtual and the actual. The process of actualisation is contingent on and inseparable from the dynamics of a given material field.¹⁵

The diagram is a spatiotemporal mechanism. It is a mode whereby virtual formless relations are actualised into concrete appearances or perhaps more precisely: a way concrete manifestations are broken and redistributed. The diagram cannot be abstracted and placed in an immaterial domain. If it could, it would not be real. Accordingly, it does not operate from a place outside the actual. The virtual and the actual are rather different tendencies in a continuous movement between formless relations and relatively stable forms. The diagram is not immaterial but immanent.

Artist and philosopher Manuel DeLanda proposes that the pursuit of an immanent diagram must proceed by performing an $n-1$ operation.¹⁶ When the one is added to the multiple then the multiple is conditioned by an essence. The multiple must be made by subtracting the one and query how a given formation is distributed. He exemplifies the approach in *Assemblage Theory* where he tries to construct a map of different thresholds in a development from the actual to the virtual and back.¹⁷

In the case of painting the motif exists only in the painting. It is not projected from the mind of the painter onto the canvas nor does it dwell in some immaterial cultural sphere. It is always negotiated within the given painting. In the case of architectural media, the representational logic is suspended. To understand this aspect of an architectural medium, it must be investigated as if it represented nothing. It is important to remember that the immanent non-representational diagram exists alongside the digital diagram and the geometric conventions. It does not annul the notational and representational faculties of drawing.

In Deleuze's book on Bacon the diagram is used to rearticulate the motif. In modern painting the motif no longer connects the painter and nature. Instead, the motif destabilises the representational figure. The motif as diagram is closely connected to the gestural nature of painting and the material presence of the canvas. It is provoked, manipulated and proliferated through the manual operations by the painter. They are often of a deliberately destructive nature turned against existing figures, i.e. clichés. In the work of Bacon, the motif is operated upon by random marks, cuts, swipes and colour patches that open, sometimes violate, the figure. However, the figure is not completely destroyed. The true function of the diagram is to be suggestive.¹⁸ The diagram must remain operative *and* controlled. The diagram is the possibility of a fact – not the pictorial fact itself. Therefore, the act of painting operates on the edge

of an outburst of sensation. It does not surrender to chaos. It attempts to use the chaotic forces to develop painting. This is the reason why Deleuze favors Bacon's work over the expressionism of Pollock and the abstraction of Mondrian. The first frees the diagram to cover the canvas completely. The second develops a symbolic code rather than a diagram, thus creating an abstract optical space.

Initially, I pointed out that the motif as diagram is neither a represented 'thing' nor a personal idea realised through the artistic process. I repeat the statement, because the focus on the manual manipulations above may sound as if the motif is a question of personal style. It must be stressed that the virtual diagram is immanent to the painting. It never exists outside the canvas. The manual actions are simply important because the motif is developed through the concrete manipulation of the actual painting.

Obviously, architectural media are quite different from the examples mentioned above. The field of architectural media is diverse and open-ended but it is fundamentally characterised by the following condition. An architectural medium can both be treated as a nonrepresentational artifact *and* as an image of and/or a set of instructions for a space to be. It needs to follow established conventions of translation from medium to building at some point in the process. It is disciplined by geometry and notation. The double nature is characteristic of architectural media and the main reason why the motif as diagram cannot be transferred directly from painting.

However, a connection can be made to the way sketching takes place and to media experiments in general. They are often concerned with the destabilisation of architectural figures and the invention of new figures. When the architect chooses, adjusts and develops an architectural medium it is not simply a question of finding the proper mode of

communication. He investigates the specific medium and ponders what it allows him to think. Therefore, the exploration of media is simultaneously a way of expanding ways of architectural thinking.

According to Deleuze, the geometric frame and sensation are closely intertwined in painting. The geometric frame alone is too abstract and sensation alone is too ephemeral.¹⁹ They need each other to exist. The frame must be sensed and sensation must be given duration. The entanglement takes place through the distribution of the motif. In the case of architectural drawings, the geometric frame needs to be more abstract in order to be translated to the building. The sensation of the architect is not only preoccupied with the relation between frame and materiality but also coupled to the imagination of a space to be. Nevertheless, all media have a material presence that influences the way the geometric frame is manipulated.

It is fair to assume that the motif as diagram is especially operative in projects where the architectural medium itself is under scrutiny. Furthermore, it is characteristic that such experiments are often informed by neighbouring artistic and pictorial practices. It is also reasonable to suggest that the motif is operative in the phases traditionally referred to as sketching. In this context, the term motif is particularly relevant to the phases of a process where the problem of the work is addressed by the architect. It includes many different media.

The digital diagram depends on a set of symbols but the motif as diagram is analogue. The term analogue does not belong exclusively to traditional media. It is not the property of a specific class of media nor does it signify similitude or resemblance. On a fundamental level, it signifies a relation of exteriority. If the relations between parts in a whole define their identity then they are relations of interiority.²⁰ Accordingly, when an architectural drawing is treated as a coherent image of a building governed

by a certain code, it is conceived of as a homogeneous whole held together by relations of interiority. Understanding a given system through the notion of relations of interiority defines the respective properties. In contrast, relations of exteriority do not define the identity of the individual parts. They are characteristic of an assemblage. It is a heterogeneous whole in which different parts interact without losing their particularity. The parts display capacities to influence and be influenced not determined by a code. Understanding a given system through the notion of relations of exteriority defines the capacities of its parts to influence and be influenced. The latter is relevant to understand the term composition.

Like the motif, the term 'composition' may sound as if it belongs exclusively to a painterly domain. In the context of architectural drawing, it signifies the drawing as a heterogeneous non-representational whole. It is an assemblage of components often of quite diverse origin. The components may come from other drawings by the architect, from drawings made by other architects or from outside architectural practice. In all cases, the drawing is an assemblage of existing material. It is a dynamic whole because all components influence each other simultaneously. When a single component is changed all other components change simultaneously. They interact through relations of exteriority and no specific component can be manipulated without influencing all other components.²¹ In other words, the only way to develop the motif is to change the actual appearance of the composition. One has to move and rearrange that which is prominent in order to observe what happens to the network of relations between components.

I will avoid any reference to how the architect thinks during a process; that is a task for others to explore. I will simply suggest that fundamentally different diagrams are at play in architectural media and coexist without forming a synthesis. The first

is the motif and the struggle to escape the clichés embedded in the representation of existing architectural figures. The second is the digital diagram and the development of a set of instructions. In my line of thought, the motif momentarily leads the maker astray from his or her considerations only to re-emerge with a new configuration. Fluctuation between impossibilities suggested by drawing and the struggle to activate the findings into something that can be implemented in reality is fundamental to the architectural drawing process.

Figures 3a and 3b show two spreads from a sketchbook by Poul Ingemann. For many years he has produced a number of drawings each day irrespective of his building projects. Over the years, a vast number of small sketchbooks have been filled. Although some of them address an actual building, many do not. The books include many detours followed with no particular end in mind other than the exploration of his vocabulary.²² The books are not completed in a linear fashion. Sometimes, they are reused and blank pages are covered with new drawings informed by existing sketches.

It is clear that Ingemann's work is inspired by classical architecture. However, in this context the motif is not simply inscribed in a classical vocabulary. The motif as diagram is rather the recurrent modes of twisting, bending and breaking apart the individual drawings. The drawings use circular and linear symmetries and appear to be preoccupied with classical symmetry. On the other hand, the symmetries are also simple operations used to construct fragmented bodies. It is striking how all figures appear unfinished and heterogeneous composed of parts from other bodies.

Therefore, the motif as diagram could be interpreted as the way drawings are broken, doubled and distributed across the pages to form clusters of related sketches that influence each other

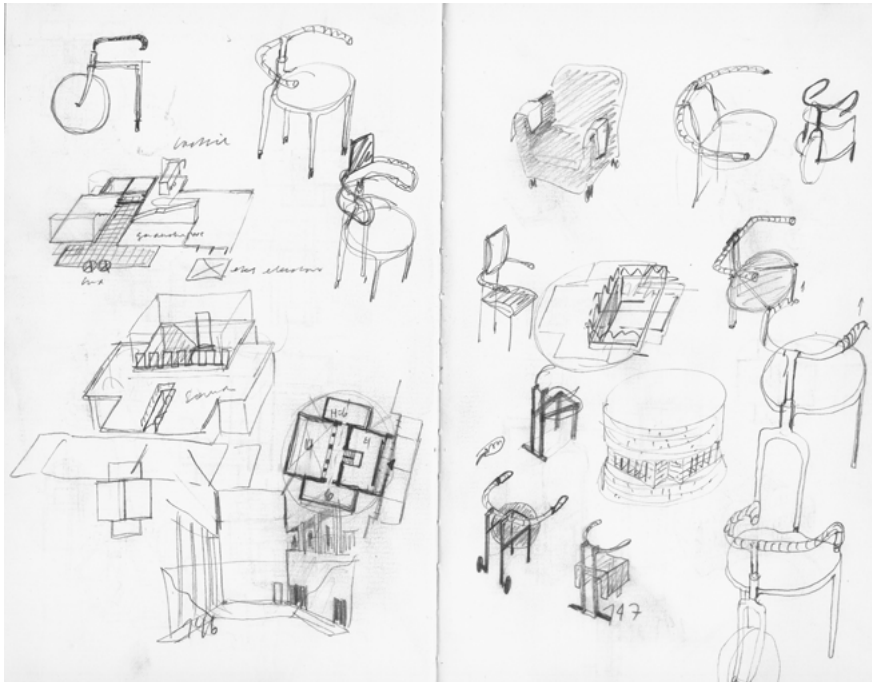


Fig. 3a

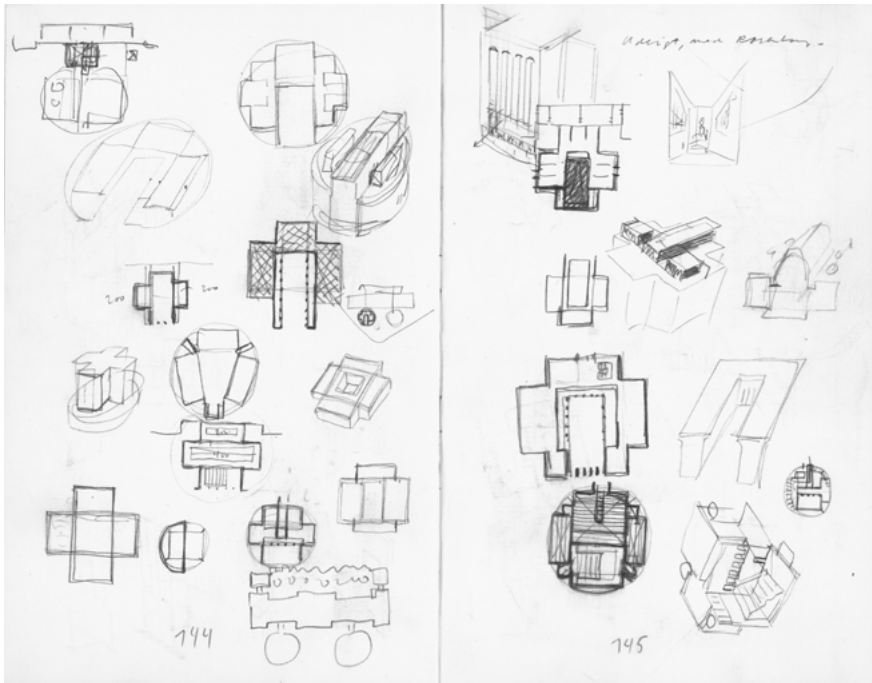


Fig. 3b

Fig. 3(a): Pages from a sketchbook by Poul Ingemann. Courtesy of the architect.

Fig. 3(b): Pages from a sketchbook by Poul Ingemann. Courtesy of the architect.

across normal categories such as building types and furniture. They are individually simple and do not appear as independent compositions. Instead they form clusters according to the problem at hand. Sometimes they may support each other in consolidating or rehearsing a particular operation; at other times they are in open conflict, provoking a new group of sketches.

When the project develops beyond sketches and experiments, others forms of drawing tend to take over. The motif is most active in the phases where the emerging project is changed. On the other hand, the development does not exclude the possibility that the mental map is the same in different phases. The adding of symbols and conventions for translation from medium to building fixes a certain interpretation of the drawing. The collage used in the proposal for the Dominican Mother house captures a fundamental motif that transgresses the formal issues and spatial relations. The basic distribution is the same in the later more elaborated versions of the project. It really concerns a social matter. In that respect the motif is from the beginning hooked into a social diagram. It is concerned with the distribution of people.

It is important to distinguish between the motif as a principle mode of distribution and the total net of relations that exists in a given composition. Not all relations are equally important nor do they influence each other in the same way. This is exemplified in Vidler's statement that the domino system is Le Corbusier's diagram.²³ The famous construction system proposed an open floor plan consisting of concrete slabs supported by thin, reinforced concrete columns. The system had no load-bearing walls and gave complete freedom to the interior. It constituted the basic spatial and constructional scheme, or skeleton you might say, that orchestrated the spatial and constructional possibilities of Le Corbusier's diverse oeuvre.

Vidler's statement does not comply directly with the motif as it has been described above. The motif cannot be construed as a concrete system. It operates in the interval between formless virtual relations and actual manifestations. It is a mode of distribution. If it is confused too directly with the concrete domino system it is mistaken for an actual manifestation and treated as if it could be repeated in a process of representation. One might suggest that such a thing has been done with the countless and sometimes mindless copies of Le Corbusier's work. However, the domino system can be seen as a simplified model harbouring a motif that may be expressed in many different ways. The expressions, or perhaps actualisations, comprise the well-known oeuvre of Le Corbusier.

I have spent some time discussing the motif because the digital diagram is easier to understand. The digital diagram complies with our conventional understanding of a diagram as a set of instructions governed by the rules of a notation system.²⁴ I have made a point of treating the digital diagram and the motif separately but in actuality they are closely connected. Mentioning both of them now is to emphasise that there are two diagrams at work in the impure mixture of drawing: a motif and a digital diagram; a set of relations and a set of instructions. The two interact in the apparatus of drawing and need each other to be suggestive or 'utopian'.

This brings us back to the Peircian diagram as presented by Stjernfeldt in *Diagrammatology*. The useful icon is not a diagram if it does not have some kind of reading rule. It is an icon governed by a symbol.²⁵ The reading rule of an architectural drawing may use a number of different conventions. It may use abstract symbols or it may use geometric conventions for the transference of an architectural image. In this respect paintings (and by extension architectural sketches) are underdetermined as Stjernfeldt remarks. They are not accompanied by

a detailed set of symbols or conventions governing their diagrammatic manipulation. However, this does not mean that a spontaneous diagrammatic ability is not in action. In a sense, the underdetermined drawing invites interpretation. The productive moments in a process might very well occur when the maker draws with no clear intent. In other words, when the mental map is loosened from intent and the motif (of a drawing for instance) is manipulated.

In a traditional process, there is often a gradual transition from an initial phase in which motifs are active to later stages where digital diagrams and/or projective images tend to dominate. Although this may still be the case in many processes, the linear sequence between analogue sketches and digital drawings has long since been overturned by a more complicated register of processes and possible drawing types. In many cases, the analogue drawing seems to be marginalised or completely absent, in others the distinction is simply difficult to make using traditional connotations of the terms. In the last part of this article, I will discuss an exploratory practice that uses contemporary technology. I will attempt to further develop some of the concepts used so far.

A technical environment

The expression 1:1 creates the illusion that the large model is a way of seeing things 'as they really are'. Apparently, the 1:1 model combines the properties of materiality, technical proximity to buildings and optimal tool of evaluation. The identical digits on either side of the colon tell us that it is not a proportional model. They also tell us that it is still a model for reasons not explained by the formula. Staying within the theoretical framework of this article it is tempting to claim that the first '1' is a map of relations compared to another map of relations: the second '1'. In other words, the large model is not a model by virtue of scale but because it is treated as a diagram. It is a whole of interrelated parts

believed to operate in a manner similar to another whole of interrelated parts (the second '1' being the imagined building).

In the last section I discuss a contemporary architectural practice in which large models and computer drawings are integrated in a media environment. [Fig. 4] shows a research project by architect and researcher Phil Ayers exploring conditions for the making of a hydro-formed structural member. Thin layers of metal are welded together along the edges and the cushions are subsequently inflated. Information on their material and volumetric behavior is recorded, fed into modeling programmes, and adjusted versions are tested. It is significant that the transition from the two-dimensional template to the three-dimensional structural member takes place not as an extrusion but as a gaseous inflation. Thus, the creation of the volumes follows lines produced by material behaviour, not projective geometry. Form is not stamped upon inert matter but emerges from the forces of matter itself. The templates are animated into three-dimensional volumes rather than extruded through the operations of linear projection.

At first glance the project is governed by the visual aesthetic of emergent form. It apparently mimics the images of dynamic nature well established in contemporary culture. I am referring to the images of complex phenomena and dynamic material processes. This kind of mimesis is based on conventional analogy according to which visual resemblance suggests a similarity in terms of property. The job of this imagery is really to establish a given project as a representative of a technological avant-garde practice. In contrast, when digital tools are integrated in the material practice of the workshop the practice potentially becomes an open-ended negotiation between computer and physical construction. Accordingly, Ayres's work progresses as a sequence of preparations, mapping

of material behaviour and ongoing adjustments.²⁶ The productive loops operate on both sides of visual representation, notation and model. The act of design is not reserved for drawing alone nor is the model simply a way of evaluating the design. His experiments suggest a reciprocal relationship between computer drawings and physical models in agreement with analogy as relation of exteriority. It highlights the importance of conceiving interface as productive difference in order to escape the imagery mentioned above.

Philosopher Gilbert Simondon pointed to this when he envisioned a mindset able to harvest the possibilities of new technologies while going beyond the mindset of optimisation and the technology of transference characteristic of modernity.²⁸ His expression 'technical mentality' signifies not simply the mindset of the technician but the dynamics of the material itself. The scheme of the technician and the scheme of the material are not the same.²⁸ The material too 'thinks' because it actualises virtual differences. Therefore, the relation between the technician and the material is a negotiation between schemes. If the term 'interpretation' suggests a hierarchy between an observing mind and an object, it is no longer sufficient to describe the relation between technician and material. A given interpretation takes place in a reciprocal relationship to the actualisation of a given dynamic material field. It requires a more explicit formulation of the term 'mental map' according to which interpretation and actualisation are different aspects of the same mental map. The map is no longer simply manipulated by a thinking mind but thinking takes place on either side of the relation.

Obviously, the architect's 'material' is not raw matter. It is an artificial medium. Since the beginning of the profession the medium has been the principle material that the architect worked with. The medium has been used to create measurements and instructions for the making of buildings

but it has also partaken in the making of the profession. It has been instrumental in separating the architect from the builder. In Ayers's practice the media transgresses the traditional categories of model object, image or notation. The environment is termed technical not simply because many different apparatuses are used but because the distinction between passive matter and active tool is transgressed. If the term architect may suggest a distance between the architectural medium and the built object then the term maker may fit this practice better. The maker is part inventor, technician and artisan. [Fig. 5]

The computer drawings are impure mixtures of animated imagery and digital diagrams. They display mimetic traits and use abstract symbols. In this context, simulation is a misleading term to use if it is understood as a representation of a temporal phenomenon. Ayers's practice exemplifies how computer drawings may develop a register for recording and responding to material behaviour. The relation between drawing and model is treated as an interface and the interface is treated as a productive difference. It is more appropriate to refer to his drawings as steering devices. The pivotal point is to conceive of the computer drawing and the model as separate yet mutually influencing subsystems in the same technical environment. Understood in this fashion, the computer drawings are characterised by manoeuvrability and responsiveness to the proclivities of the physical construction. The drawings record and manipulate information about the nature of the model but not only in a prescriptive manner. They are rather immersed in the total assemblage of architectural media that constitutes the experiment. Drawings and models are related maps in the technical environment. The drawing in figure 5 is a map of interrelated parts believed by the maker to operate in a manner similar to the model on the floor. However, the model on the floor is another map of interrelated parts; the second the maker abandons the drawing and manipulates the

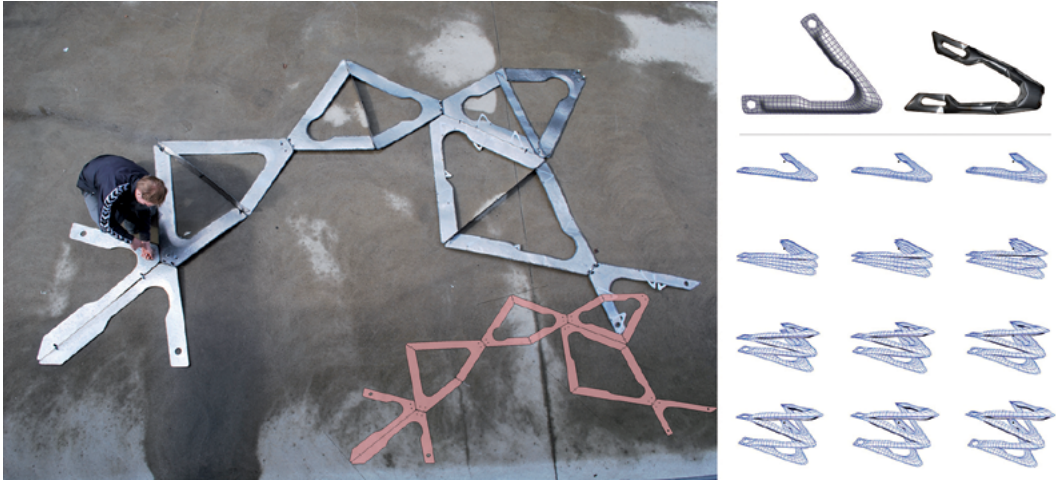


Fig. 4

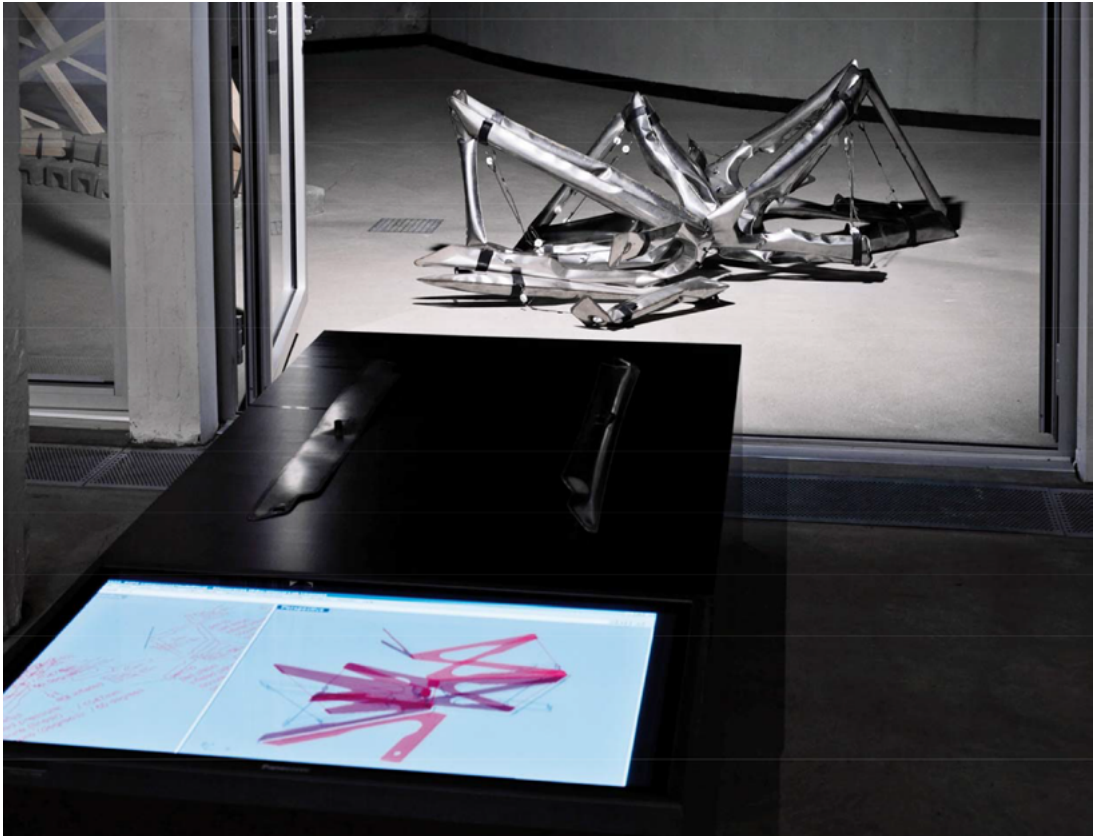


Fig. 5

Fig. 4: The image on the left shows a spread of metal cushions waiting to be inflated. The images on the right show a computer simulation of the expected forms. Courtesy of Phil Ayres.

Fig. 5: Image from an exhibition showing the visual representation of the deformations and the concrete model. Courtesy of Phil Ayres.

physical construction. Then the model becomes the diagram and the drawing becomes the object influenced by the manipulation.

In general, it is fair to assume that the maker treats the members of the assemblage as different incorporations of the same diagram. If he did not, the environment would be too loose and the process would not intensify the relations. The emerging assemblage is heterogeneous but it is nevertheless a whole. The distinction made earlier between the multitude of relations of a particular composition and the principle mode of distribution still applies to the spatial assemblage. It is important to remember that the concrete manifestations of a diagram are different but the fundamental mode of distribution is the same. Navigating the media environment is simultaneously a way of trying to understand how the diagram works *and* a way of cultivating it.

Figures 6 and 7 show a later stage of the project combining self-forming inflated metal components acting as compression members and tensile cords creating a tensegrity structure. A distinction is made between the high specificity of the structural members and the under-specificity of their contextual response. The system is envisioned to be in a continuous state of negotiation between internal demand and exterior environment. The structure is clothed in a pneumatically activated skin with the ability to change state creating different shadings in response to changes in exterior conditions and interior demands.

I suggest that the diagram present in the work of Ayers is found in the relation between architectural construction and atmosphere. The diagram animates the construction by an exposure to atmospheric instabilities. It is operative in the inflation of the metal cushions but also in the responsive structure of the final stage of the project.

What happens to the motif in all of this? Considering the changeable nature of the last example it is no longer confined to a drawn composition as the ones mentioned earlier. It may seem to have disappeared for lack of a more stable receptacle such as a traditional drawing. However, it could be argued that it is relocated in the spatial installation. On a general level, the Peircian diagram requires a whole of interrelated parts that can be manipulated in order to learn more about another whole of interrelated parts. It also rests on some form of simplification and on the presence of a reading rule. All are present in the media environment described above. Therefore, it takes part in a diagrammatic inquiry.

On a more concrete level, I propose that the motif distributing a two-dimensional drawing is joined by a spatial plot. The original tension between an analogue motif and a digital diagram is joined by the feedback between an analogue spatial construction and tactically inserted computer drawings. What was formerly a struggle between representation and suggestion is now a reciprocal relationship between steering devices and material phenomena in a technical environment. The digital drawings are not without mimetic residues nor are they without compositional traits. But they operate in relation to, sometimes as part of, an analogue spatial installation by mapping and adjusting the emerging structure.

Fundamentally, the immanent diagram is the relational net that distributes the discernable parts of a drawing, a model or an installation. It is a motif in the two-dimensional drawing and a plot in the technical environment. In any case, it is the possibility of a fact. The two-dimensional drawings discussed earlier are closer to Piet Mondrian's paintings.²⁹ They struggle with the two-dimensional image in order to produce new architectural figures. The architectural practice discussed in this section takes

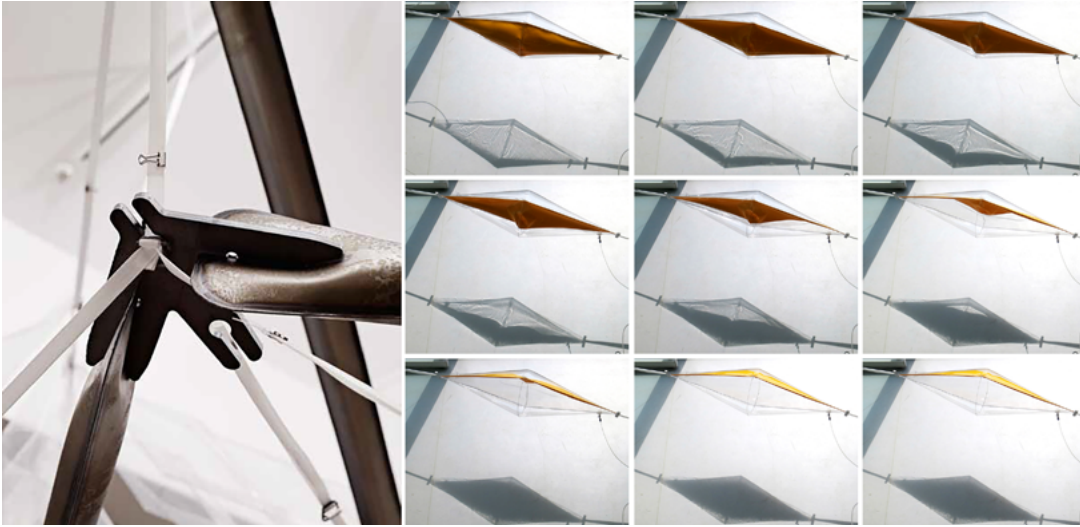


Fig. 6

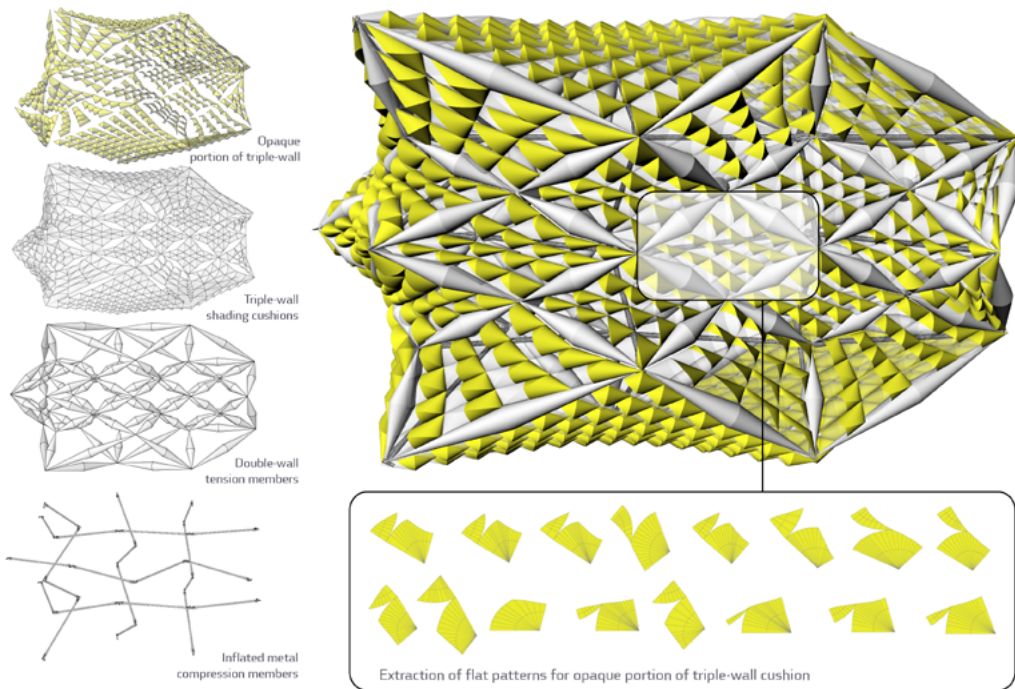


Fig. 7

Fig. 6: On the left detail of the construction. On the right experiments with the skin of the construction. Courtesy of Phil Ayres.

Fig. 7: Simulations of the interaction between tensile cords and compression members. The structure is covered with a pneumatic skin. Courtesy of Phil Ayres.

place in a reciprocal relationship between material behaviour, animated images and code. It operates on a diagonal between two-dimensional picture planes and a three-dimensional installation. The productive materiality of the image is supplemented by the material behaviour of the models and their distribution on the ground.

The Ayers example suggests a technical environment in which the old distinction between tools, materials and makers is transgressed. The technical environment is comprised of many different media and one needs a skeleton of relations to navigate it. The different media take turns in performing the role as map. The maker moves between media, treating them as diagrammatic objects, thereby learning different things about the total assemblage. The mental map is developed across the technical environment in pursuit of a particular problem. In a sense, the mental map is simple whereas the environment is manifold.

Further inquiries

'Do not block the Way of Inquiry!' If we are to follow Peirce's motto, the main job of the final section is not just to conclude on the findings but rather to present the most important parts of the problem and propose how the inquiry might be continued. The sketch of the mechanisms between different diagrams and the possible trajectories for further study constitutes the key contribution of the article.

I have introduced three diagrams. The mental map, the digital diagram and the immanent diagram. I divided the immanent diagram into the motif and the plot. In doing so, the immanent diagram was connected to both two- and three-dimensional media. I have predominantly treated the digital and the immanent diagram separately to focus on different aspects of the media. In reality, they operate simultaneously in architectural media as two distinct operators in a single heterogeneous

apparatus – that of an architectural medium. They have been framed by the Peircian diagram according to which they are different agents in a mental map. As a consequence, the focus has been on the architectural medium in the course of an exploratory process.

The examples have served to discuss a transition from the traditional relationship between drawing and building to a heterogeneous assemblage of different media. They constitute a trajectory where the linear relationship between representation and object is transgressed by a technical environment that needs adjusted or new concepts to be understood properly. The diagram as a map of relations is a fertile concept able to navigate the heterogeneous nature of the environment because it is not restricted to either side of the distinction between image and object.

The list of diagrams emerges from an observation of specific media practices and steps across the border between image, model and installation. Although they may violate traditional categories they are still distinct. They are merely temporal invariables not to be confused with concrete styles or particular media. Before, when architectural practice was characterised by a more stable and limited number of media, it was easier to define the media in terms of representation and inherent properties. Current practices, especially experimental ones, are characterised by a more diversified and complex set of media. This complexity is not properly understood if the number of categories are simply multiplied. A distribution of contemporary media into new categories tends to establish properties rather than capacities to influence and be influenced by other media in a given assemblage. The complexity of the technical environment needs another kind of invariable defined in temporal terms. The proposed list of diagrams should be understood in this light.

It is noteworthy that so-called old media are not simply abandoned but rather reused and integrated in the new assemblage. Therefore, the examples in the article do not represent a progression but an ongoing expansion of the toolbox.

A further inquiry might take on a number of possible trajectories. I have focused on a certain type of process concerned with the development of a problem, that I have referred to as exploratory, framed by the Peircian diagram. I have also limited myself to the relationship between an individual architect and/or maker and a set of architectural media. In doing so, I have avoided a number of difficult yet pertinent questions deemed to be too extensive for the framework of this article.

The first trajectory interrogates the mental map in light of the technical mentality suggested in the article. The problem is introduced with reference to Simondon but it is also relevant to pursue in the contemporary theoretical field of new materialism. The question is how the mental map of the architect negotiates the actualisations of virtual differences in a given material. The trajectory would need to rearticulate the concepts of interpretation and material far beyond the initial suggestions made in this article.

The second investigates the way the diagrammatic inquiry of an individual relates to a collective of architects and other participants in the process. The assumption is that the concept of the diagram is well suited to transgress the opposition between the individual author and the network of individuals. The virtual diagram is precisely the way different members in an assemblage are distributed through their mutual interaction. The relationship between individual and collective is sometimes trivialised in architectural discourse by normative viewpoints valuing one over the other.

The third traces the motif from the exploratory phases of a project to the architectural media used to communicate a project. The question is how and if the motif continues to be in operation or whether it is erased by the later stages of representation and notation. In principle, it can be extended all the way to the spatial organisation of the building and the life forms of the inhabitants. In doing so a number of thresholds appear from the motif of the drawing to the collective of makers and eventually to the social context of the building. Considering the way virtual diagrams manifest themselves in heterogeneous series the line from drawing to social context and back is assumed to be non-linear. The diagrams connected to spatial organisation meet social technologies outside the architectural domain and the investigation of a particular drawing is inscribed in a larger social field. Therefore, the latter trajectory does not simply bifurcate in a number of different directions. It questions how the central problem of an architectural inquiry develops.

On a general level, I envision a mapping of architectural diagrams going beyond technological progression and traditional media categories. Perhaps then we can begin to ask more clearly how the specific diagrams allow us to think and develop a diagrammatology for architectural media.

Notes

1. Anthony Vidler, 'What Is a Diagram Anyway?' in *Peter Eisenman; Feints*, ed. Silvio Cassara (Milan: Skira Editore, 2006), 20.
2. *Ibid.*, 22.
3. Charles Sanders Peirce, 'The First Rule of Logic', in *The Essential Peirce*, ed. Nathan Houser and Christian Kloesel (Bloomington: Indiana University Press, 1998), 48.
4. Malene Busk, 'The Diagrams of Peirce and Deleuze', in *Cartography, Morphology, Topology*, ed. Cort Ross Dinesen (Copenhagen: Kunstakademiet)

- Arkitektskoles Forlag, 2009), 172.
5. Frederik Stjernfelt, *Diagrammatology: An Investigation on the Borderlines of Phenomenology, Ontology, and Semiotics* (Dordrecht: Springer, 2007), 278–79.
 6. Stan Allen, *Practice: Architecture, Technique, and Representation* (Amsterdam: G+B Arts International, 2000), 34–35.
 7. Ibid., 32.
 8. Ibid., 39.
 9. Nelson Goodman, *The Languages of Art* (Indianapolis and Cambridge: Hackett Publishing Company, 1976), 113.
 10. Ibid., 218–21.
 11. Ibid., 121.
 12. Allen, *Practice*, 35.
 13. Michael Merrill and Louis Kahn, *Louis Kahn – Drawing to Find out: The Dominican Motherhouse and the Patient Search for Architecture* (Baden: Lars Müller, 2010).
 14. Gilles Deleuze, *Francis Bacon: The Logic of Sensation*. (London and New York: Continuum, 2004), 99–110.
 15. Gilles Deleuze, *Bergsonism* (New York: Zone Books, 1988), 96–98.
 16. Manuel DeLanda, *Assemblage Theory* (Edinburgh: Edinburgh University Press, 2007), 119.
 17. Ibid., 108–36.
 18. Deleuze, *Francis Bacon*, 101.
 19. Ibid., 112.
 20. DeLanda, *Assemblage Theory*, 10.
 21. Deleuze, *Bergsonism*, 42.
 22. The sketches develop an analogue language inseparable from the act of drawing. Deleuze, *Francis Bacon*, 111–21.
 23. Vidler, 'What Is a Diagram', 25.
 24. Allen, *Practice*, 42–44.
 25. Stjernfelt, *Diagrammatology*, 96.
 26. Phil Ayres (ed.), *Persistent Modelling: Extending the Role of Architectural Representation* (Abingdon, NY: Routledge, 2012), 1–3.
 27. Gilbert Simondon, 'Technical Mentality', in *Being and Technology*, ed. Arne De Boever, Alex Murray, Jon Roffe, and Ashley Woodward (Edinburgh: Edinburgh

University Press, 2012), 12–14.

28. Brian Massumi, "'Technical Mentality' Revisited: Brian Massumi on Gilbert Simondon', in De Boever et al. (eds), *Being and Technology*, 28.
29. Deleuze, *Francis Bacon*, 103–6.

Biography

Peter Bertram is an architect, researcher and educator at Royal Danish Academy of Fine Arts, School of Architecture (KADK), Copenhagen. He received his master's degree from the Royal Academy in 1995 and completed his PhD there in 2008: an artistic development work concerned with the conditions for the production of the new in an architectural process. He has exhibited his work in Denmark and abroad, including the Architecture Biennale in Venice. His articles have been published in journals, anthologies and conferences, among others *Frembringelse* (The Bringing Forth of Difference) (2009), *The Makings of an Architectural Model* (2011) and *Academic Dissensus* (2016). He is head of the architecture committee in the PhD-school at KADK. In 2015–16 he was Institute leader at the Institute for building culture at KADK. He is one of three initiators to the first international biennale for Artistic Research at KADK held in the spring of 2017.

Reconceptualisation of Architects' Intentionality in Computational Form Generation: A Tripartite Model

Duygu Tüntaş

At the turn of the century, with the developments in computer science and increased capacity in information processing provided by the computational paradigm, studies on computational design display great interest in complexity management. The introduction and extensive use of computation and its associative thinking in the design process led to a great expansion of the dominant mode of computation – especially in form studies – that largely relies on data-driven forms as outcomes of pure calculations and rationalistic determinism. While the aim is to cope with the intricacy of data, as Zeynep Mennan informs us, the ‘improved means and methods used in complexity management do not reduce but rather increase’ the complexity of design problems.¹ In order to respond to the rapidly changing status of these technology oriented tools and mindsets, designers made an epistemic choice in favour of rationalisation with avoidance of subjectivity and its related modes of design thinking.² As an alternative to the increasing interest in this techno-rational tendency, this study proposes to understand and assess design intentionality by unfolding and thereby reflecting on designers’ internalised processes.

Design intentionality

An investigation of design intentionality and its possible relationship with form computation is a great challenge. This study posits that such a link can be found in the interspace between the externalisation processes of design thought and their translation into a computational medium; it does

so by examining the role of computation in the externalization of cognitive operations or ways of thinking that would be specific to the act of design, i.e. design behaviour. In an interview with Daniel Rosenberg, Humberto Maturana characterises design behaviour by conceptualising design operations and processes as *doing*, which is philosophically different from *being*, and describes design as an intentional act.³ He asserts that

the intentional act of design consists of manipulating the world that you live [in] ... something will happen – in the flow of the changing cosmos that you are bringing forth with your living – so that you will be able to make a particular desired distinction and say, “this is what I wanted to do”.⁴

He continues, ‘as an intentional act, however, design specifies certain conditions of operation which will be the grounding conditions for something to happen, if those initial conditions are satisfied’.⁵ Maturana argues that ‘things are structure determined entities, so the task is to understand what is the organization, what is the structure, and what is the domain of variability.’⁶ This means that design tools have structural dynamics inside, and the design operation is bound to the logic of that thing, i.e. its organisational capacity and coherence.⁷ Like any other design tool, he considers computation as a tool for designers, very similar to what a brush is for an artist by emphasising its structural dynamics defining its operational capacity and the domain of variability.⁸ From this viewpoint, there will be

conditions where the design tool may not respond to the designer's thought processes because of the incompatibility of the computational method's inner structural dynamics and underlying formal system with the design intentionality.

In *The Electronic Design Studio*, George Stiny points out the challenge created by the epistemological gap between the nature of the world of design and the 'structured' nature of computational world.⁹ He states that 'designers do many things that computers don't. Some of these are bad habits that the stringencies of computation will correct. But others are basic to design, and cannot be ignored if computation is to serve creation and invention.'¹⁰ He emphasises the importance of ambiguity in design to feed 'imagination and creativity' and to incorporate 'multilayered expression and response' into computational procedures.¹¹

The dominant approach to form computing

In his foreword to Kostas Terzidis's *Expressive Form*, William Mitchell approaches the problem of dominant computational approach from a pragmatic-formal level.¹² Mitchell associates the formal tendencies with an '*economy of shapes*' – suggesting the availability and ease in the creation of some forms with certain methods – while the expansion and restructuring of these tendencies has been sustained with the advancements in computer technology.¹³ Terzidis defines the same trend in the field of computational design, but this time from an epistemological perspective.¹⁴ He notes that

what makes computation so problematic for design theorists is that it has maintained an ethos of rationalistic determinism – the theory that the exercise of reason provides the only valid basis for action or belief and that reason is the prime source of knowledge – in its field. Because of its clarity and efficiency, rationalistic determinism has traditionally been a dominant mode of thought in the world of computation. The problem with this approach is that it assumes that all

computational activities abide by the same principles. In contrast, intuition, as defined in the arts and design, is based on quite different, if not opposing, principles. ... This mode of thought comes in contrast to the dominant computational model where methodical, predictable, and dividable processes exist.¹⁵

Terzidis reveals that the world of computation, in which a more rational, confined, organised, and methodical model exists, is resistant to such characterisations belonging to the human world, where 'intuition has been an underlying assumption for many design activities.'¹⁶ Elaborating on this division, he claims that the mathematical processes can easily be translated into quantitative methods, thereby, can be controlled through computation, whereas 'manipulations, evaluations, and combinations of these processes are qualitative processes and as such can be handled by the architect.'¹⁷ He notes that at the point where we shift our design modes from manual to computerised, it is necessary to 'integrate the two seemingly contrasting worlds, that of intuition and that of computation'.¹⁸ The outcome of such reconciliation may provide an alternative to the dissolution of subjectivity.

As Terzidis points out, computational methods are argued to be rational because of their 'mechanistic nature,' and similarly, they are claimed as incapable of 'artistic sensibility and intuitive playfulness in their practice'.¹⁹ In a similar way, Axel Kilian considers computation to be in many cases 'an obstacle ... in translating design intent', since 'it lacks the fluidity of human thoughts'.²⁰ And he argues against this dominant view by stating that

design should not be solely about the execution of established processes but about querying the understanding of the factors involved. This is a much more complex task and it goes far beyond the traditional geometric and numerical representation of current computational practices but it happens in designers' minds regardless of the involvement of computation.²¹

By extension, Kilian proposes to see the critique of the dominant approach to computational design not as 'a glorification of human designers' but as 'a reminder of the respective strengths and weaknesses of the different approaches', and not to perceive them as competing processes but as 'a potential collaboration between design in the mind and its externalised computational processes'.²²

Based on the analytical and generative capacity of computational thinking, Roland Snooks observes that the algorithmic approach is an agent-based bottom-up approach where there is no predetermined idea of form, and form is dependent on the capability of the architect to 'encode architectural intent within the operation of the algorithm'.²³ As he explains, algorithms are used as generic templates for architects and they are 'abstract formal generators operating on an appropriated logic, devoid of any recognition of the architectural problem or proposition'.²⁴

A change in the computational infrastructure of architecture

In 'Design Signals: The Role of Software Architecture and Paradigms in Design Thinking and Practice', Panagiotis Michalatos discusses how information technology, and therefore the complexity paradigm, altered architectural production through the inscription of the digital ontologies in architectural software.²⁵ He argues that the issue of what constitutes an architectural object is embedded in the data infrastructures of the software that architects use, and 'these ontologies determine what is observable, accessible, transmissible and achievable; in short, what is representable within a digital environment'.²⁶

Practitioners within the fields of computer sciences and information technology design ontologies in order to deal with information and reduce complexity.²⁷ As Michalatos says:

By designing an ontology, one determines the objects, operations and relationships that can be described within an information processing system. This determines what attributes are stored in files and databases, and what objects are presented to users to interact with. The makers of the software that architects use also therefore influence the design process and thinking, for they determine the objects and actions, the very language in which architects think while designing.²⁸

After explaining the impact of computational infrastructures on design thinking and operations, he further argues that 'the more elaborate and specialised the ontology, the less suitable the software becomes for the early stages of design where ambiguity can be more productive'.²⁹ He then demonstrates this argument with the example of BIM software where there is a so-called *architectural ontology* with the presence of already defined architectural objects, such as walls, floors, staircases and doors etc. However, such an approach to design is already very limiting in the inscription of the design idea.³⁰ Especially for the early stages of design, where creativity is essential, the designer's intentionality radically drops with the enforcement of pre-defined objects and the increased elaboration of the software ontology. Consequently, design becomes limited first because the object of design and its associative tools are predetermined within the definition of such a specific ontology, and secondly, the data structures become partially accessible and interactive through the user interfaces that suggest 'a language through which specific aspects of a design can be considered'.³¹

The more complex design becomes, the more information is inscribed in an architectural object. Michalatos defines this condition as 'information granularity', resulting from the inscription and storage of massive data and tracking the network of actions that inform different parts and layers of the digital model, and therefore leading to highly

granular and distributed models 'to record and represent the design process itself and its outcomes'.³² This inevitably encouraged architects to use workflows and their interfaces for the organisation of data and to make these highly granular models and data complexity accessible for themselves.³³

In a recent issue of *Architectural Design*, Kutan Ayata, founding partner of the architectural office Young & Ayata, argues that the developments in computational technology has altered the evaluation and representation of architectural design process in two ways: 'form follows arrow' – step-by-step diagrams that try to make sense of formal transformations, and 'form follows data' – 'an overly redundant set of steps regarding the generation of form is displayed to demonstrate various software protocols, parameter performance, data inclusion and stages of digital maturation' with the aim of recording 'justifiable evidence of formal becoming'.³⁴ He criticises these practices for inevitably reducing the complexities of architecture into technological-looking linear representations and failing to reveal 'the logic of the system that [really] matters'.³⁵

A change in the role of the architect

The discussion on the incompatibility of the nature of computation and associated methods with designers' intentionality and thought processes has another layer that further opens up a question about the role of the architect. While a number of scholars expect or call for a dissolution in architects' authoring design process, some still emphasise its necessity. This paper argues that this controversial status of the architect's role could be challenged by reconceptualising design intentionality. According to the writers of *Architecture and Authorship*, such an attempt will maintain 'a kind of topography for architectural action, therefore, forming a conceptual surface that allows architecture to develop as a coherent discipline'.³⁶

Pablo Lorenzo-Eiroa raises a question on the role

of the architect in authoring computational processes where the inner dynamics of software may inform the whole design formation: 'if structure is predetermined by the interface, the designer is merely interpreting a variation that completes the implicit combinations that the metaphysical project of the interface proposes, placing the programmer as the author'.³⁷ Here, structure or underlying logic corresponds to the inner principles of an interface that could easily affect the construction of formal logic and may restrain and determine the formal freedom and control of the architect. Hence, if the architects cannot express the individuality and encode design intentionality in algorithms, then the architects' role will be diminished, correspondingly, could be questioned and replaced by the programmer.

Scott Marble, editor of *Digital Workflows in Architecture*, points out another setback in the use of computational methods which is caused by the pre-determinacy of algorithms, and suggests an integration of computational control and architects' freedom to inscribe the design intentionality in algorithms, thus restating the architects' role and authorship.³⁸ He exemplifies David Benjamin's computational design approach as a resolution to this problem:

Human intuition and judgment occur when designing the design space of a problem, by choosing the inputs and evaluating the outputs to an algorithm but also by designing the algorithm itself. This, then, is not seen as a reduction of authorship; by focusing exclusively on the design space as the locus for decision-making, algorithms are positioned as creative tools that expand the design capabilities of architects. By designing the algorithm, the relationship between constraints (to control possible design options) and variables (to explore possible design options) can become an integral part of the architect's overall design intent.³⁹

As Marble informs us, Benjamin defines the role of the architect as the mediator between what

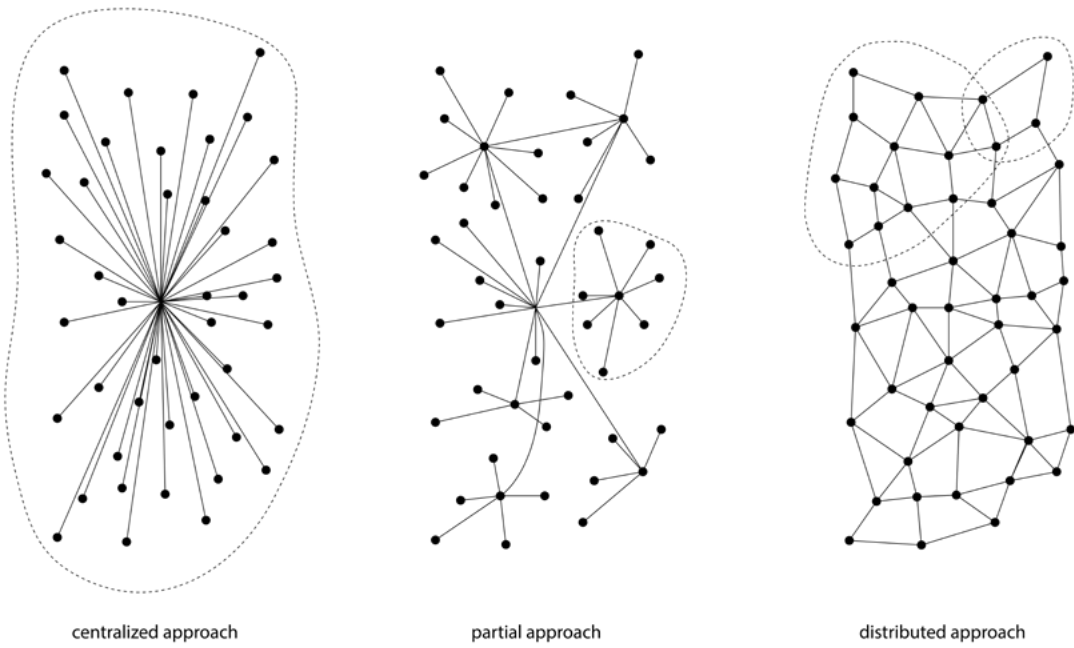


Fig. 1: Diagram of the tripartite model based on the network diagram proposed by Paul Baran, *On Distributed Communications*, (RAND Corporation, 1964), 2. Drawing: author.

is controllable and what is explorable in design processes; in this way the design intention could be inscribed and embedded into the algorithm, enabling freedom and control simultaneously.⁴⁰ Marble continues: 'the identity of the architect is largely built upon her or his ability to author design solutions' and the challenge is in 'capturing the full range of architectural design intent within digital workflows'.⁴¹ He suggests the proper formation and expanded use of digital workflows, which has the potential to transform the role of the architect with freedom and control in computational processes that 'ha[ve] been increasingly displaced by technologically mediated processes over a long time'.⁴²

David Benjamin criticises the position of the architect in using exiting software and programming languages: 'Yet algorithms are not neutral or inevitable. They are designed with assumptions and biases that condition what they produce. And if these assumptions were different, the designs produced through them would be different'.⁴³ In computational processes, if form generation is so dependent on the algorithms, and the designers cannot control them through their design intentions, the whole process and internal form relations would be delimited with the pre-determinacy of algorithms. Pablo Lorenza-Eiroa discusses this problem in his *Architecture in Formation*:

It is quite clear that if architects do not recognize the underlying logic of the interfaces and displace the given source codes of algorithms to create their own, their work is trapped by a predetermined set of ideas, cultural projections, and aesthetic agendas contained within those interfaces.⁴⁴

In order to trace possible negotiations between architects' intentionality and operational modes – or *inner structural dynamics* – of algorithms and computational processes, an organisational model is proposed.

An organisational model for architects' intentionality

In the field of computation and communication sciences, the concept of the network has been defined for the management and organisation of information.⁴⁵ In 1964, Paul Baran explored the possible hierarchical and non-hierarchical operational structures for communication and diagrammatised centralised, decentralised and distributed network models.⁴⁶ [Fig. 1] The concept made its way into the realm of architecture in the late twentieth century as 'network practice', which corresponds to the organisation and distribution of work and collaboration among design actors.⁴⁷ Tom Wiscombe writes about a complex organisational model – *emergent* networks – which is different from simple collaboration whose organisation is basically an accumulation around similar interests.⁴⁸ He suggests that emergent networks 'can create new and complex coherences out of divergent interests', whose products are non-predictable and non-linear.⁴⁹ It is possible to find a basis for these complex organisations in Baran's model in which different approaches to form computation can exist as independently, as well as combinatorial ones can be produced to map different forms of externalisations of design intentionality.

In the first diagram, the components are directly connected to the centre; accordingly, the only hierarchical layering is in between the centre point and the components. In the second model, the components are connected first to the local centres, and then these sub-centres carry the information to the main centre. In this decentralised approach, a multi-level hierarchical structure increases the chance of transmission of information compared to the first diagram. However, in the third diagram, there is no distinct organisational hierarchy and therefore each point could be assigned desired importance within the system. This distributed form of organisation simultaneously enables both freedom and control in the management of information.

Translation of this diagram and corresponding terms from communication and network sciences to the field of computational architecture as *centralised*, *partial* and *distributed*, constitutes a platform for an assessment of architects' intentionality in form computation.⁵⁰ Based on the employed computational logic and design intention, the possible interpretations of these approaches suggest a coherent *field* of recent approaches and methodologies to reconsider architects' intentionality in the computational form. Such mapping will provide a spectrum of approaches as well as exhibit a gradient epistemic scale, a representation in which the so-called epistemic oppositions – of subjectivity and rationalisation, human and computational thinking etc. – do not operate antagonistically (as competing notions), but rather, in a complementary manner.

Clearly, the approach to management and organisation of data is different in these three models. Through an analysis of the pattern formation and organisational structure between parts (inputs, outputs) and relations (design actions) within the whole design process, the overall computational approach can be assessed. [Fig. 2]

A centralised computational approach

The centralised approach can be described as the model where there is a single central node where all data is sent, which then directs the data to the intended recipient.⁵¹ According to Alejandro Zaera-Polo, this kind of approach to computation can be interpreted as a centrally organised algorithmic system 'that tries to articulate everything at once'.⁵²

In this approach, there exists an underlying idea about the formal logic rather than a predetermined idea of final form, and an algorithm can be designed or customised to write a specific code.⁵³ As Zaera-Polo notes, the condition that the use of computation is central to the generation of form makes this approach more vulnerable to the alterations in the

selection and use of software, since any adjustment in the initiator or the structuring of the code will directly change the resultant configuration.⁵⁴ Therefore, in this model, there is a direct relationship between computational rationality and form generation which dominates and, in parallel, delimits the externalization of design intention. Therefore, this deeply nested relationship between the design of the computational structure and form generation entails a dependency on the ability of architects to translate design ideas into computable languages.

As an example, the work of Roland Snooks – whose approach falls into a rather experimental and innovative design field – reflects such a centralised model; in which, according to Mennan, he managed to inscribe his design intentions within the computational logic by participating actively in the computational processes through what Snooks calls 'strange feedback' that attempts to hybridise creative characteristics of both bottom-up algorithmic processes with the top-down decision mechanisms of architects.⁵⁵ Such interference to centralised algorithmic systems is very difficult to employ; since it requires relying, on the one hand, on to a high level of expertise in computational design methods, and on the other, on an ability to understand the nature of their limitations and find ways to incorporate them. Despite this challenge, similar attempts will extend the creative capacity of the computational design processes, this time enabling more control and freedom to the architect as well.

A partial computational approach

The second model in Paul Baran's diagram corresponds to a decentralised networking system, in which there exists a hierarchy between parts, subcentres and the centre: a series of subcentres are connected to the main centre; rather than the heaviness of one-centred system.⁵⁶ This condition of having multiple centres/processors instead of a single one enables a specialisation between

the subcentres and its connected part. In such a condition of compartmentalisation, each cluster is expected to work in itself, and later, the outcome is transferred from a subcentre to the main centre. Then, all data is processed in the main centre. In this approach, manual and computational design processes can be combined. The central organisational system could be a computational structure or a conventional design process. Since in this model, design could be composed of multiple methods that are partially processed either intuitively or determined by computational rationality in sub-centres, the term 'decentralised' is assessed and interpreted as 'partial' in the context of computational architecture. Such a terminological shift is necessary to reflect certain approaches and intentions to use computational methods and associative technologies, and then, open up further discussions on designers' intentionality in computational architecture.

Partial computation is already a functional method in the field of computer science, used in the evaluation and optimisation of partial programmes with the given parameter values.⁵⁷ If we borrow and apply this definition to the field of architecture, it suggests the application of computational methods to evaluate and optimise *partial phases* of the design process with the given parameter values, where computation is not necessarily central, but rather partial to formal content and overall organisation.

According to David Benjamin, studies based on optimisation and efficiency can be placed under this approach, where the main reasoning in the use of computation is not *exploratory*, but rather *explanatory*.⁵⁸ Based on this definition, pre-rationalisation and post-rationalisation can be discussed as the dominating uses of this approach and therefore positioned under a partial computational model with reference to their partial capacity to have an impact on the overall design approach and form generation.

It can be argued that the intentionality in the use of computation is similar in both approaches, however in pre-rationalisation, computational rationality is superior to architects' subjective thought processes, whereas in the post-rationalisation, subjectivity and intuitive decision mechanisms are prioritised. In the former, the design process begins with a deterministic approach, whereas for the second approach, the formal logic has the flexibility to be dominantly subjective and intuitive, yet eventually, is partially rationalised to evaluate and optimise the intended form for fabrication or for performative reasons.

As a critique of this performative or optimisation approach to form computation, Benjamin examines efficiency and creativity, two contrasting yet complementary concepts, and their implications in the field of architectural design. He names them, 'exploitation' and 'exploration', meaning respectively, 'utilising [the] existing' and 'searching for [the] new'.⁵⁹ He states that

designers interested in exploitation prefer a narrow, continuous design space, such as a slanted plane or a topological surface with one or two bumps. In this case, it is possible to quickly hone in on the region of best performance and to locate the single global maximum. The simpler the design space is, the faster they can find the optimal design.

Designers interested in exploration prefer a wide, discontinuous design space, such as a jagged mountain range with multiple peaks. In this case, there are many distinct regions of good performance, and it is often possible to find multiple local maximums that are both interesting and high-performing, even if they are not the global maximum. The more complex the design space is, the more likely it is that they will make an unpredictable discovery.⁶⁰

Benjamin also suggests introducing 'subjective criteria' into optimisation processes in order to integrate the seemingly separate qualities of

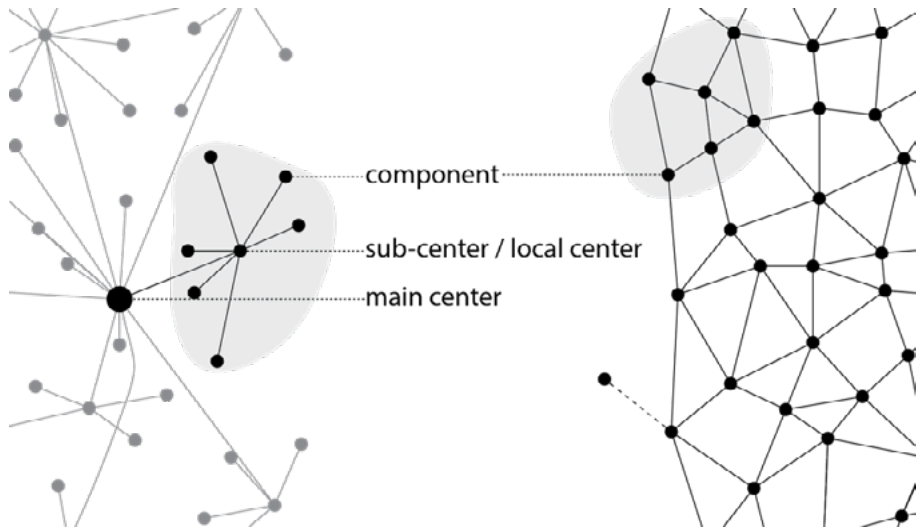


Fig. 2: Varying part-whole relationships in computational models. Image: author.

human intuition and creativity with computational thinking.⁶¹ Even though such a method is under-utilised, it would enable designers to incorporate subjective criteria, such as aesthetics, mood, identity and interpretation of architectural programme, with objective technical criteria, like structural performance and circulation efficiency, in the same optimisation process. In such a process, he argues that the subjectivity of the architect is translated into objectives and value judgment, and the designer's creativity comes from 'designing objectives and designing experiments rather than simply designing solutions', makes the architect more engaged in designing the problem and focused on potential design space, 'the complex topological surface'.⁶² About the degree of subjectivity in these processes, he claims, 'although they might be buried and hidden, they are there.'⁶³

It is possible to place pre-rationalisation, post-rationalisation and reverse engineering under this model. As the name clearly expresses, in *pre-rationalisation*, the rationalisation process is at the early stages of form generation, consequently the formal logic is dependent on the initial-factual data and therefore, arguably, highly objective. This approach can also be defined as a data-centric approach since the form is optimised from the beginning, and efficiency is the major decisive factor in form generation.⁶⁴ Thomas Fischer explains this approach by mentioning Buckminster Fuller: '[his] approach of addressing design challenges before they become acute, which he referred to as "comprehensive anticipatory design science" is largely based on the concept of pre-rationalisation'.⁶⁵

As a result of the dependency of form on the data, the freedom and subjectivity of the architect in form generation can be evaluated as *low*, but since the construction of the design problem and the intention to use such methods belong to the architect, it still embodies some degree of subjectivity but in a highly rationalised form.

In *post-rationalisation*, on the other hand, the use of computation is partial; the rationalisation process is placed at the final stages of form generation. The formal logic is dependent on the intuitive and artistic decision making of the architect and therefore, arguably, belongs to the 'subjective world of states of consciousness, or of mental states – with intentions, feelings, thoughts, dreams, memories'.⁶⁶ This approach can also be referred to as the intuitive approach, since intuition is the major decisive factor and source of reason in form generation. Although intuitive processes depend more on subjective design decisions, this approach still requires a degree of rationalisation at the final stages in order to calculate structure and to construct and fabricate the final form.

Based on the intuitive decision-making of the architect, this approach mostly denotes a traditional top-down approach where the creator relies on his/her background knowledge and former experiences. This 'knowledge-based approach, as William Mitchell defines it, can be problematised, as the design intentions and mechanisms are inaccessible since they exist in a closed system or a 'black box' where the idea of form is in the designer's mind and is predetermined'.⁶⁷

There exists a more generative version of post-rationalisation, which deals with *reverse engineering* in order to unfold the black box and translate the subjectively constructed form to a computable environment through extracting the underlying logic and geometry of a final form. By doing so, this method enables more than just post-rationalisation; it helps to breed new variations of the reverse-engineered form from unfolding its design mechanisms.⁶⁸ The biggest challenge here is the involvement of a secondary subject who is not the author of the design, but another designer who interprets the process – and his/her ability to understand the design intentions and formal logic and translate them into a computational model.

Mark Burry's research on Gaudí's design of the Sagrada Familia is an instructive example of this type of approach.⁶⁹ Here, according to Neil Leach, Burry explores 'digital techniques for understanding the logic of Gaudí's own highly sophisticated understanding of natural forces'.⁷⁰

One may remark that the partial approach to computation is highly practical and offers more freedom to designers in the employment of the design intentionality. However, it fails in rendering a generative and creative formal approach, as it lacks exploring the potentials brought along by the computational world. The idea here is much rather to confirm the design decisions with calculations and validating the final form, instead of creating a new ground for unprecedented forms and formal relations.

A distributed computational approach

In the simplest version, distributed computation can be defined as the condition where the multiple use of algorithms and codes is distributed through the different and particular stages of the design process. Different from partial computation, this approach includes both design exploration and exploitation, and furthermore, it is flexible and intention-oriented.⁷¹ Therefore, in this approach, intentionality is distributed among the multiple human and non-human agencies, and as Alejandro Zaera-Polo explains, it is 'the co-evolution and optimisation of relationships between multiple routines, mediated through the mainframe, which is able to produce real innovation, rather than the heaviness of a centrally organised system that tries to articulate everything at once'.⁷²

This approach can also be referred to as a non-linear workflow approach in which computational methods are used and customised to a certain degree, to adopt the architect's intentionality. It includes employing custom and disposable codes, which are 'intentionally purpose-built for the task

at hand', to respond to specific problems or spontaneous needs at certain phases of the design process in order to encourage creative thinking rather than perfect the code itself.⁷³

Promoting a distributed approach in computational design, Tom Wiscombe explains the problem with a centralised computational approach: 'You lose too much information when everything in an architectural problem has to be processed through an algorithm. Inputs are forced to become quantitative or otherwise abstract in order to be able to be computed, so it is not surprising that outputs are also anemic'.⁷⁴ Wiscombe further criticises the categorisations of design approaches based on dichotomies such as bottom-up or top-down and suggests the implementation of the right position and a useful design tool for the problem.⁷⁵ He states that

there are such hardened camps now: you are either a bottom-up researcher or a top-down designer; you either experiment with means, or you design towards ends. A crossover term I like is 'messy computation' – it is open-ended enough to allow you to be a designer but also capitalises on the advantages of recursion and agency. Nothing is taboo that way. You pick and choose the right tool for the job, and more importantly, create custom workflows which jump around between techniques. It's a patchwork of scripting, modeling, painting, and engineering, which I find very convenient, and happily, free of ideology.⁷⁶

In 2009, Neil Leach points out a shift prior to the introduction and multiplication of computational methods in architectural design, explaining that 'the architectural imagination has been displaced into a different arena – into the imaginative use of various processes'.⁷⁷ Calling for a change in the dominant approach to computation, in 2012, Scott Marble identifies a further shift experienced in the dominant computational approach: 'from process to workflow'.⁷⁸ He states that 'the identity of the architect is

largely built upon her or his ability to author design solutions' and the challenge is in the 'capturing the full range of architectural design intent within digital workflows', and he suggests the proper formation and expanded use of these non-linear workflows, that have the potential to restate the architects' intention with the freedom and control that have been 'increasingly displaced by technologically mediated processes over a long time'.⁷⁹

In a recent issue of *Architectural Design*, Richard Gerber indicates the inclusiveness of workflows as 'they can accommodate the personalized design processes of architects as well as integrated engineering strategies and collaborative ideas about building delivery'.⁸⁰ Along with the inclusive nature and flexibility of a non-linear workflow approach, the challenge is the management of the complexity created by the involvement of different specialised design parts and the vast amount of specialised information distributed within the same process.⁸¹ However, it allows for design collaboration and inclusive design practices in order to respond to the increased amount of information and complex design problems. This leads to a great extension in the capacity of the architect. Accordingly, this dismantling and distributing of computation throughout the design process makes it more efficient and flexible to encode the designer's intentionality. Hence, the design intentionality becomes more visible due to the radical increase in freedom and control over form. Furthermore, it enables instantaneous design experimentation and rationalisation within the same system by integrating two seemingly contrasting worlds – that of computation and intuition – with more freedom in subjective criteria.

Conclusion

Presenting a theoretical framework to reconceptualise architects' intentionality in computational form generation processes, this paper instrumentalises communication and network diagrams as an alternative reading of current approaches to form

computation. The point of departure in this search arises from the gap emerging from the epistemological opposition of human and computational thought processes, and in turn, the changing role of the architect in computational design. This gap created by the shift to the language of computation and its associated rationality requires reestablishing the modes of intentionality, since as Mennan suggests 'calculation leaves an incomplete space that cannot be saturated with information alone and waits to be filled with meaning and interpretation'.⁸² Recent attempts reveal that such reconciliations are possible. A new model in which design intention is encoded within the operation of code writing is in the process of replacing the dominant computational model. Such a change is indicated in these new approaches where intentionality remains impure, distributed and embedded within the computational models.

Notes

This article has stemmed from my PhD study at METU, Department of Architecture supervised by Prof. Dr. Zeynep Mennan, to whom I would like to express my sincere gratitude. A portion was developed during my research at Columbia University GSAPP as a Fulbright visiting scholar, and an earlier version of the study was presented at the CAAD Futures Conference and published in the book of proceedings in June 2017.

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73. Marty Doscher, 'Disposable Code: Persistent Design', in Marble, *Digital Workflows*, 207.
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75. Ibid.
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79. Ibid.
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81. Marble, 'Introduction', 7–11.
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Biography

Having received her undergraduate and graduate degrees from the same department, Duygu Tüntaş is currently a PhD candidate and full-time faculty member at Middle East Technical University (METU) Department of Architecture, in Turkey. Her research interests include architectural form processes and computational design research. She has been awarded several prizes in architectural design competitions and received a Fulbright visiting scholarship for her PhD research.

On Bigness and the Problem of Urban Form

Armando Rabaça and Carlos Moura Martins

The title of this essay borrows the term ‘bigness’ from Rem Koolhaas, who introduced it into the urban lexicon to describe multifunctional large-scale buildings. The problem posed by Koolhaas is twofold, implicating both urban and architectural design. Our concern here is restricted to urban form.

The view on the city as a complex process with multiple actors which cannot be controlled by the planner harks back to the critique of the modern utopian visions and dream of ‘total planning’. One strand of the postmodern critique maintained the emphasis on form and type. A line of thought within this strand is represented by Kevin Lynch, who rescued a tradition extending back to Camillo Sitte’s aesthetic approach to urban design, interpreting urban form through Gestalt psychology. As Alan Colquhoun has noted, however, Lynch’s strictly phenomenological approach avoids all typological analysis, failing to demonstrate how to provide the city with a coherent urban structure.¹ The lines of thought represented by Aldo Rossi and Colin Rowe, in turn, acknowledge the impossibility of ‘total planning’, seeing the city as an urban continuum accommodating a set of interconnected parts, each of which may adopt a formal or typological principle of its own.² Faced with the inoperability of the traditional planning instruments, planners have more recently shifted to notions such as that of open-ended planning, focusing on strategic interventions capable of securing large-scale urban principles, while granting a degree of flexibility to accommodate the ‘spontaneous’ processes of the various

urban actors. To the most extreme visions within this strand, the city can no longer be thought of in terms either of form or type. All that remains for the planner is to attempt a strategic functional structure to be delivered to the unpredictability of the market and life. Koolhaas’s theories carry this reasoning to the extreme. For him, the contemporary city is the generic city, the unplanned city emerging in areas of urban expansion that have managed their liberation from the historic core, opposing permanent mutations, utopian fragments, irrational phenomena, and ‘fractal and endless repetition’, to history, identity and character.³

Koolhaas’s provocative vision is of the skyscraper as the ‘final, definitive typology’ of the contemporary city, operating an irrevocable split with urban history since large-scale buildings are allegedly independent of context and incapable of establishing relationships with the ‘classical’ city. They rather compete with planning, he adds, acting as a city within the city. Although acknowledging that the contemporary city is the product of multiple actors and that the metropolitan scale leads to a system of multiple parts, the question we would like to pose is this: is bigness really incapable of establishing a dialogue with the existing city? Or, on the contrary, can it be seen as a tool with which to rework and/or continue the city’s formal and typological principles? Put differently, can bigness reopen the debate on urban form and type in the context of the contemporary city?

Unlike Koolhaas, our focus is neither the Asian context nor areas of urban expansion liberated from the historic core. Our concern is mainly the context of European cities and the way bigness can operate as a mechanism through which to put urban expansion in dialogue with existing urban types, thus avoiding the homogenisation and lack of identity and character of the generic city.

Urban form and type are therefore seen here as an evolving process. Type, as Rafael Moneo has noted, is not a 'frozen mechanism' but 'the frame within which change operates'.⁴ If cities such as Manhattan are the product of bigness itself, for the European cities, bigness is a relatively new urban type introduced in a late phase of their 'natural development', generating a conflicting tension with their functional, symbolic and formal structures. How can bigness inform new areas of urban expansion within an evolutionary framework of typological continuity?

In order to answer this question, we will look back at Paris and Berlin in the early twentieth century, when the problem of the metropolitan scale was first addressed in a consistent way in Europe, and the American skyscraper was brought into the discussion inaugurating the debate on bigness.⁵ Then we will look at three designs by Jacques Herzog and Pierre de Meuron which illustrate the legacy of this early debate in the contemporary context. The first design is the recent Elbphilharmonie building in Hamburg, Germany (2003–2017).⁶ It is a 100-metre-high building that incorporates a mix of urban uses, with programmes ranging from a large concert hall to a hotel and from flats to health and fitness facilities, internalising public space by creating an elevated 'plaza'. [Fig. 1] The second is the design for the exhibition *Ideen für das Herz einer Großstadt – Berlin Zentrum* (*Ideas for the heart of a big city – Berlin Centre*), shown at the Deutsches Architekturmuseum, Frankfurt, between 26 January and 24 March 1991. [Fig. 2] It consists of

four large-scale buildings for vacant sites around Berlin's Tiergarten, to the west of the city centre. Each of the four large cubic volumes was to be deprived of architectural visual characteristics and referents. The communicative dimension of architecture was to be replaced by electronic information displayed on the façades, elaborating on arguments of conceptual art.⁷ Lastly, the 2006 Triangle building for Paris, to be completed by 2020. [Fig. 3] This is a high-rise multifunctional building with a triangular shape, to be built at the Porte de Versailles beside the peripheral belt of the city, mediating between Paris's centre and the peripheral urban conurbation to the south.⁸

In accepting the notion of type as a framework of change, it seems reasonable to see the skyscraper as the ancestor of these buildings. Like these, the skyscraper eludes easy categorisation. It is a building type that is not defined by function, as other types are, but mainly by dimension, which is not absolute but relative to its surroundings. What is more, the objectual condition of these buildings substantially differs from the explorations in megastructures of the 1960s such as those of Archigram or the Metabolists, who thought of the city as a growing structure where there is no clear distinction between architecture and urban design. True, the mixed-use nature of buildings such as the Elbphilharmonie or the Triangle building seem to fulfil Fumihiko Maki's 1964 definition of megastructure as 'a large frame in which all the functions of a city or part of a city are housed'.⁹ Yet they lack the scale needed to cannibalise the existing city and become the city itself, as envisioned by the megastructure theories.

In sum, we are concerned with large-scale buildings rooted in the technological developments of the late nineteenth and twentieth centuries, conceived of as autonomous formal entities, presenting (though not forcibly) multiple programmes, and the role this kind of building may play in the urban form of existing cities such as Hamburg, Berlin and Paris.



Fig. 1: Jacques Herzog and Pierre de Meuron. Elbphilharmonie, Hamburg, Germany, 2003–2017. Photo: Iwan Baan.

The early European debate on the skyscraper and the metropolitan urban form

The first debates on the skyscraper in Europe took place in France and Germany in the early twentieth century, inevitably accommodating the American referent to the specificities of these countries' urban and cultural contexts.¹⁰ In Paris, the debate on urban planning was still marked by Haussmannian design. Although still incomplete, and despite the growing conservatism with regard to unrestricted demolition required to street penetrations, the Haussmannian intervention had established and consolidated an urban dominant order. This contrasted with the surrounding suburbs, with the continuous movement of the poorer classes outward from the centre giving way to haphazard urban growth. Due to political and financial limitations, planning efforts in the early decades of the century focused on short-range projects rather than on comprehensive long-range planning.¹¹

Although this context did not leave much space for the debate on the skyscraper, the latter emerged associated with a debate on an extension plan for Paris centred on the ring of old fortifications and the axis of Saint-Germain, a twenty-kilometre-long straight artery linking the Étoile to Saint-Germain.¹² Discussion on the obsolete military structure had started in the 1880s. The idea of replacing it with a ring boulevard and some building development in the early twentieth century was influenced by the contemporary debate on the Garden City movement and the park system designs in American cities.¹³ Based on these discourses, Auguste Perret envisioned, from 1905 to the 1920s, a ring of regularly spaced skyscrapers and greenery for it (Paris 'surrounded by a belt of huge buildings').¹⁴ For the Saint-Germain axis, and others to come, he envisioned the same essential model: 250-metre-wide avenues with spaced skyscrapers on both sides, interspersed by green spaces.

As Passanti has noted, Perret was approaching the skyscraper through the images of the medieval turreted city wall and the 'boulevard ramparts and royal roads around the Paris of Louis XIV'. Although there was no serious debate on the skyscraper in Paris, Perret shows how the new typology was equated with the tradition of Parisian urbanism, its broad axes and monumental buildings. The same can be said of Eugène Hénard's urban visions, as suggested by his 1910 *Ville de l'avenir*, a circular arrangement of high-rise buildings dominating the urban fabric and creating a new hierarchical order which, nevertheless, reinforces the concentric layout of Paris.¹⁵

In Berlin, by contrast, the debate on the skyscraper was more serious and it followed the American model more closely. Skyscrapers were thought of in terms of a central business district. One reason for this was Berlin's urban context, which was radically different from that in Paris. Despite radical peripheral growth, a major problem in Berlin was the city centre, with its crowded Mietkasernen and traffic congestion.

In terms of urban form, the background to the German reception of the American model was the debate on urban planning that took place at the turn of the century in German-speaking countries, leading to the 1908 competition for Greater Berlin.¹⁶ The competition had two main objectives. On the one hand, it aimed at a unified strategy of urban planning capable of solving the traffic and sanitation problems and the housing shortage. On the other hand, it should provide the German capital with the necessary dignified expression to represent the German Empire—a beauty and grandeur which, in contrast to Paris, Berlin did not have. Berlin's lack of beauty and representativeness had been a theme of debate since the beginning of Kaiser Wilhelm II's reign, resulting in interventions in the city centre, varying from state administration



Fig. 2



Fig. 3

Fig. 2: Jacques Herzog and Pierre de Meuron. *Ideen für das Herz einer Großstadt – Berlin Zentrum*, 1991.

Photomontage : Herzog & de Meuron.

Fig. 3: Jacques Herzog and Pierre de Meuron. *Triangle building*, Paris, 2006–2020. Photomontage: Herzog & de Meuron.

buildings to monuments and from cultural facilities to public spaces. The Reichstag, Museum Island and Siegesallee are examples of this policy. Yet these interventions were relatively fragmentary and lacked a comprehensive strategy.

The debate around the industrialised metropolis provided two main strategies that would resurface in the entries for the competition: the monumentalisation of the city centre and the uniformity of the urban fabric.

Joseph Brix and Felix Genzmer's entry for the competition of Greater Berlin (first prize) proposed the monumentalisation of the centre through a monumental square – a forum – as an endpoint to a monumental avenue. In addition to the monumental centre, the entry proposed various groupings of cultural buildings, certainly influenced by Paris and its Haussmannian homogeneous urban space punctuated by monumental buildings.¹⁷ The same can be said of Bruno Schmitz's entry (fourth prize), which proposed a monumental centre with huge axes, high-rise and domed buildings, and town squares. [Fig. 4] The model for the nationalist representativeness of the tower was at hand. The Bismark Towers built all over the Empire from 1898 onwards had the capacity to awaken the national sentiment and unify the German people, as explained by art historian Karl Scheffler: 'The mass of the people is always in favour of the tower. It lies in their blood from time immemorial.'¹⁸

Hermann Jansen (also first-prize winner) and Bruno Möhring (third-prize winner), in turn, searched for monumentality in the uniformity of the residential blocks and urban tissue. Jansen explicitly rejected the need for monumental squares and buildings in the preface to his submission, although he considered the aesthetic dimension of urban design as paramount. The philosophical and sociological fields provided the basis for the debate on uniformity. Sociologist Georg Simmel, building

upon Ferdinand Tönnies's 1887 *Gemeinschaft und Gesellschaft* (Community and Society), saw the problem of the cosmopolitan city in terms of a conflict between individual and society.¹⁹ On the one hand, he saw state buildings and educational and cultural institutions as signs that surpass the personal and express communal life and culture, thus presenting a suprapersonal urban image. On the other hand, however, the plea for a collective urban dimension also led to the categories of uniformity and organic cohesion. Simmel conceptualised it through the image of Italian cities, where he saw variety integrated into the unity and cohesion of an organic whole. The meaning of uniformity and organic cohesion is clearly expressed by Scheffler, for whom the homogeneous appearance of the cosmopolitan city due to the uniform plans and façades of apartment blocks – as in Haussmannian Paris – was an expression of modern democratic urban society and uniform social demands, generating a democratic monumentality.

The attempt to apply the notion of unity to the new metropolitan scale was one aspect that cut across all the competition entries. If, in terms of form, the key notions were uniformity and organic cohesion, from the functional point of view the strategy consisted of turning the several neighbouring cities and villages involved in the competition into a 'unified whole' through the design for a solution to the traffic problem.²⁰ Jansen had a pioneer's vision in this respect. He saw the city as a flexible organism composed of dispersed urban components, introducing the notion of city region as a synthesis of various differentiated urban areas, each with key public buildings. These urban areas were to be structured by the 'skeleton' of a traffic network, providing the basis for urban growth. Jansen was initiating the concept of the flexible, strategic urban plan, open to growth, change and negotiation according to need.²¹ In short, the metropolitan scale had led to the notion of an organic whole which did not imply a continuous urban tissue. In this context,

the skyscraper was interpreted differently than in Paris, though equally anchored in history, as it provided the means to reconcile formal unity and the flexible organic whole of the metropolis.

The skyscraper as *Stadtkrone* of the metropolis

The idea of a metropolitan unified whole emerging from the Berlin competition was thought of not only in terms of function and circulation, but also in terms of form, applying the notions of centrality and uniformity to the new scale. The skyscraper had a key role in this respect. Due to its scale, it provided the opportunity to transpose the view on the city as a formal whole to the metropolitan scale through the notion of *Stadtkrone* (city crown).

Several aspects of the overall debate on the city were preparatory to this view. The aesthetic approach to the city that had been inaugurated by Camillo Sitte's 1889 *Der Städtebau nach seinen künstlerischen Grundsätzen* (*City Planning According to Artistic Principles*) was gradually put in terms of *Grossform* (the large-scale form of the city). Theodor Fischer's 1903 *Stadterweiterungsfragen mit besonderer Rücksicht auf Stuttgart* (*City Expansion Issues with special consideration for Stuttgart*) had rescued the image of the organic unity of the medieval city as a unified formal entity crowned with the Gothic cathedral, conceptualising it in the notion of *Stadtkrone*. The Berlin-Charlottenburg Seminar on City Planning (1908–20), founded by Brix and Genzmer and triggered by the Berlin competition, placed an emphasis on the city as a whole, and developed to include the visual connection with the surrounding landscape, introducing the discussion in terms of the overall silhouette of the city as a unified object in the landscape.²² In 1916, in his *Kulturarbeiten* (1901–1917), Paul Schultze-Naumburg introduced the notion of *Stadtlandschaft*, or urban landscape, which took on the meaning of *city as landscape*.²³ And in 1919, Bruno Taut's *Die Stadtkrone* propagated Fischer's notion, conceptualising the city as an entity crowned by a dominant

building – or set of dominant buildings – with symbolic meaning capable of giving cohesion to the overall image of the city.

The German discussion on New York's and Chicago's skyscrapers was built on, and fostered, this larger debate on the city conceptualised as a unified formal entity, composed of a uniform urban fabric dominated by a monumentalised centre – a *Stadtkrone* – set against the surrounding landscape and punctuated by secondary symbolic buildings. Through its scale, the skyscraper could become the *Stadtkrone* of the city region.

This is expressed in a 1912 opinion poll conducted by the newspaper *Berliner Morgenpost* on the use of the skyscraper in the city of Berlin. The most significant statement is by Peter Behrens, who expressed how strong an impression was made on him by the towering business buildings looming on the horizon on entering the port of New York. Seeing in these high-rise buildings the germ of a new architecture, he argued for the aesthetic and symbolic role of the American model in turning the overall view of the large horizontal city of Berlin into an entity 'graspable as an architectural image', with a 'uniform character and stylistic idea'.²⁴ In other words, the skyscraper would provide the 'uniform' metropolitan urban fabric of Greater Berlin with a *Stadtkrone* endowing it with a recognisable urban form. As Scheffler put it, 'a business zone which forms the nucleus of the metropolitan image' composed of 'skyscrapers – office buildings comprising a large number of identical storeys'.²⁵

The role of the skyscraper was increasingly addressed in the 1920s, with a continuing emphasis on the overall form of the city. The main argument was that the mass of buildings should be punctuated by a set of skyscrapers strategically located in order to endow Berlin with a modern urban expression, while avoiding the lack of order of Chicago and New York. The notion of *Stadtkrone* underlying

these statements lingered, as demonstrated by many sources, from Ludwig Hilberseimer's 1926 urban plan for the *Wohlfahrtsstadt* (Welfare city—a circular city with fourteen-storey high-rises at the centre, and density and height gradually diminishing to single-family houses at the periphery), to Erich Mendelsohn's portrait of Lower Manhattan with Brooklyn Bridge in the foreground, intentionally framing a pyramidal silhouette of skyscrapers in the background, or even the iconic representation of the city of the future in Fritz Lang's film *Metropolis*, a dense concentration of skyscrapers forming a pyramid, also portrayed in Boris Bilinsky's 1927 design for the film's poster.²⁶

In sum, with the contribution of sociology, German architects conceptualised the metropolis as a discontinuous urban tissue with homogeneous masses of residential buildings of identical height and an understated architectural language (expressing the common needs of democratic society) from which representative buildings stood out for their scale (expressing cultural identity). The skyscraper provided the possibility of transposing the formal imagery of the traditional city to the metropolitan scale, that is, of reconciling the metropolitan scale with the image of the city as a formal entity.

These ideas spread beyond Germany. A paradigmatic example is provided by Le Corbusier. Although obscured by the rationalist emphasis of his discourse, aesthetics played a central role in Le Corbusier's urban design, as illustrated by the 1922 *Ville Contemporaine*.²⁷ [Fig. 5] Its design incorporates the garden city model and a geometric and axial system, reflecting both the Parisian planning system and the American utilitarian urban grid. These principles are, however, submitted to a formal synthesis of the city conceived of as a formal entity: a pyramidal silhouette formed by the central *Cartesian* skyscrapers – the downtown business district – crowning the geometric layout and

uniformity of the residential buildings and greenery. The fact that the plan is limited in growth only reinforces the aesthetic nature of the design and the concept of *Stadtkrone* on which it is based.

For Le Corbusier, this diagrammatic conceptualisation of the 'ideal city' played no small part in reshaping existing cities. The Plan Voisin – the practical application of the model to Paris – proposes a new crown for the city. [Fig. 6] Although this new *Stadtkrone* of skyscrapers implied a new hierarchical order that would transform the city's *Grossform*, it was conceived of as continuing the French tradition of urban planning and the urban history of the city of Paris, its monumental buildings and axial structure of streets.²⁸

Unsurprisingly, the dialogue between the skyscraper and the existing city is clearer in less radical projects, such as the 1930–31 project for the Porte Maillot square, in the peripheral belt of Paris. Le Corbusier proposed two skyscrapers defining a monumental entrance to the city and promoting continuity between the Grand Armée avenue, linking to the Étoile to the east, and the avenue of La Défense to the west, beyond the peripheral boulevard, thus continuing the Champs-Élysées axis and the principle of large axes and monumental focal points of Paris's urban design.²⁹ [Fig. 7] Another example is the 1932 Plan Macià for Barcelona. Here Le Corbusier proposed a group of skyscrapers lining up in front of the old quarter along the port, forming a massive front towards the sea. The skyscrapers would mark the geographic urban limit and establish a large-scale *Stadtlandschaft* composition with the hill of Montjuïc and the ring of mountains surrounding the city, exploring the *Grossform* of city and landscape.³⁰

All this illustrates how the European import of the skyscraper was framed by the contemporary debate on urban form.

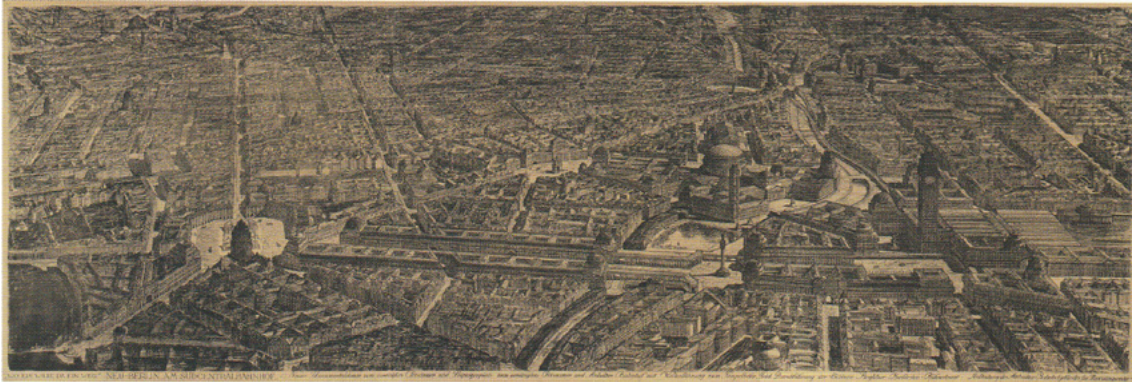


Fig. 4



Fig. 5

Fig. 4: Bruno Schmitz and Otto Blum. Entry of the competition for Greater Berlin, 1908–10. Architekturmuseum der Technischen Universität Berlin, Inv. Nr. 8008.

Fig. 5: Le Corbusier. Diorama of the Ville Contemporaine, 1922. Drawing: FLC/Pictoright, 2017.

Urban form vs. architectural form

In playing the role of *Stadtkrone*, skyscrapers had a central aesthetic role to play in the overall image of the city, leading to an emphasis on the object. On another level, the early twentieth century European import of the American skyscraper took place with great acclaim for the formal role that the structural frame could play in modern architecture. Whereas the frame was, for the Chicago architects, 'convincing as a fact', constituting a pragmatic response that did not aspire to a rationalist manifesto, in Europe it became an *idea*.³¹ By turning the structural frame into the basis for architectural language, European modernism sought to create a symbol of the second machine age. How was the objectual condition of the skyscraper as *Stadtkrone* reconciled with the modernist plea for truth in architecture, focused on turning the structural frame into the basis of architectural form?

The answer lies in the glazed curtain wall. Through it, modern architects sought both an emphasis on volume and its correspondent urban expression, on the one hand, and a focus on the frame as architectural expression on the other. For Le Corbusier, transparency rendered the 'machine' visible from the exterior, as illustrated in the drawings of the skyscrapers for the Ville Contemporaine.³² At the same time, his concern with urban form led him to search for volumetric definition. As a product of the machine, skyscrapers could be seen as geometric prisms 'cut with a precision of theory', perceived through the 'epidermis ... of an enveloping gesture'.³³

The double aesthetic role that Le Corbusier ascribed to the glazed façade is more clearly expounded by Mies van der Rohe and his well-known entry for the 1921 competition for the Friedrichstrasse skyscraper. [Fig. 8] Passanti has noted that several elements of Mies's design echo Le Corbusier's.³⁴ This influence would be accommodated in Mies's German intellectual framework,

through which he could interpret the glazed façades through essentially the same duality. At the architectural level, glass meant, for Mies, the possibility of revealing the structural system through transparency. In 1922 he published his design, together with the design of his second glass tower (1922), in *Frühlicht*, Taut's Expressionist journal, writing that

Only skyscrapers under construction reveal the bold constructive thoughts, and then the impression of the high-reaching steel skeletons is overpowering. With the raising of the walls, this impression is completely destroyed; the constructive thought, the necessary basis for artistic form-giving, is annihilated and frequently smothered by a meaningless and trivial jumble of forms. At the very best one remains impressed by the sheer magnitude, and yet these buildings could have been more than just manifestations of our technical skill. This would mean, however, that one would have to give up the attempt to solve a new task with traditional forms; rather one should attempt to give form to the new task out of the nature of this task.

The novel constructive principle of these buildings comes clearly into view if one employs glass for the no longer load-bearing exterior walls.³⁵

Mies owes his allusion to constructive thought as a necessary basis for artistic form-giving to Scheffler, who, in his 1913 *Die Architektur der Großstadt* had associated a new aesthetics of the metropolis with unfinished buildings as Ur-form.³⁶ Yet, at the urban level, glass was a matter of plasticity:

The use of glass, however, necessitates new approaches. In my design for the skyscraper at the Friedrichstrasse railroad station in Berlin, intended for a triangular site, a prismatic form corresponding to the triangle appeared to offer the right solution for this building, and I angled the perspective façade fronts slightly toward each other to avoid the danger of an effect of lifelessness that often occurs if one employs

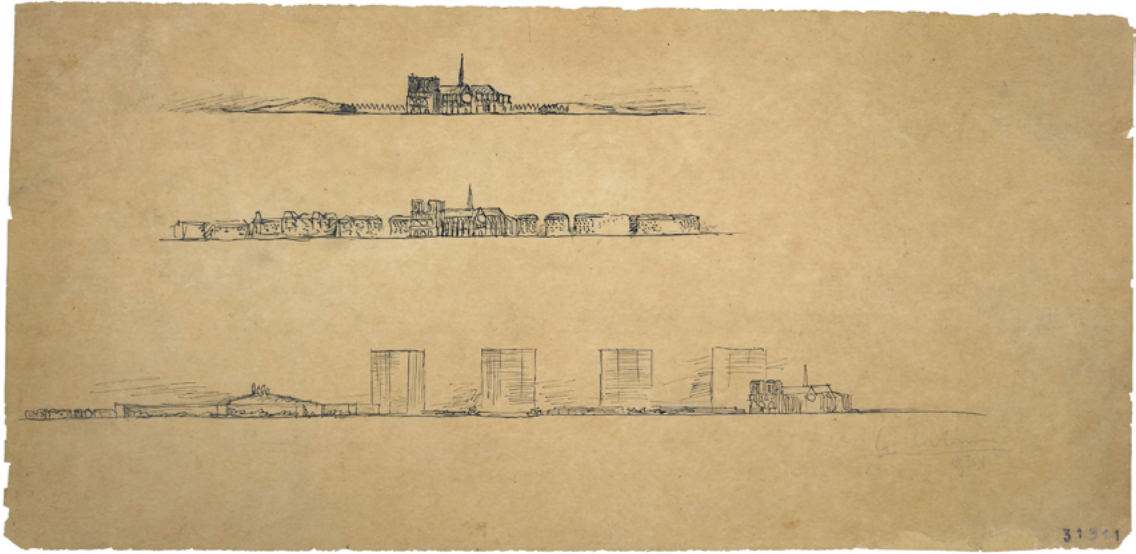


Fig. 6

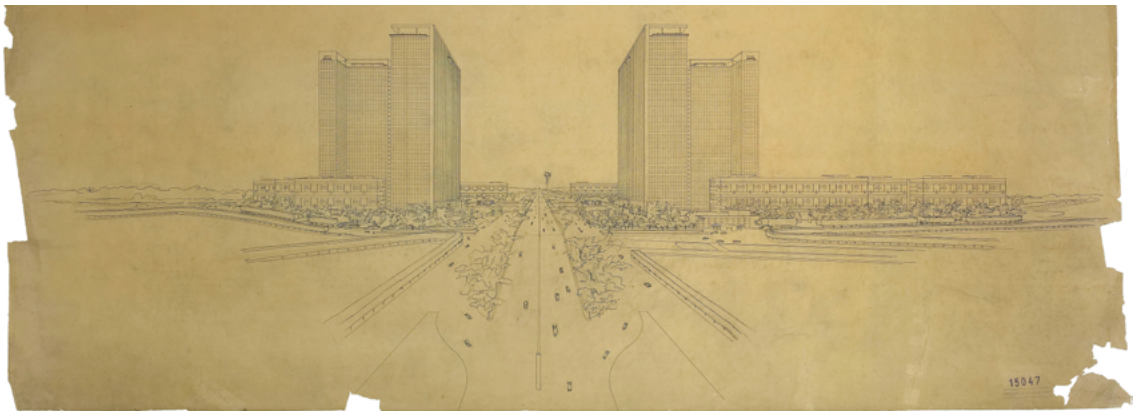


Fig. 7

Fig. 6: Le Corbusier. Plan Voisin seen as continuing the history of Paris's urban skyline, 1925. Sketch: FLC/Pictoright, 2017.

Fig. 7: Le Corbusier. Porte Maillot, Paris. View of the two skyscrapers and the continuous axis of Grand Armée and La Défense avenues, 1930–31. Drawing: FLC/Pictoright, 2017.



Fig. 8a: Mies van der Rohe. Friedrichstrasse skyscraper, 1921. Photomontage: Bauhaus-Archiv Berlin.



Fig. 8b: Mies van der Rohe. Glass Skyscraper, 1922. Model: Digital Image @ 2017 MoMA, NY/Scala, Florence.

large glass panels. My experiments with a glass model helped me along the way and I soon recognized that by employing glass, it is not an effect of light and shadow one wants to achieve but a rich interplay of light reflections. That was what I strove for in the other design published here [the 1922 skyscraper]. ... The curves were determined by the need to illuminate the interior, the effect of the building mass in the urban context, and finally the play of the desired light reflection.¹³⁷

Here, Mies was building upon the ideas of novelist Paul Scheerbart and his influence on Expressionist aesthetics, disseminated in *Frühlicht*. For Scheerbart, *Glasarchitektur* (architecture with walls made of coloured glass) was a symbol of and means to construct a purified, changed society.³⁸ The aesthetic dimension involved in the Expressionist experiments is well known and is certainly related to Mies's interest in the changing 'interplay of light reflections'. Yet his concern with the 'effect of the building mass in the urban context' is essentially the same underlying Le Corbusier's emphasis on geometric definition: the role of the skyscraper in shaping a new urban form.

In Le Corbusier and Mies, then, the problem of form of the large-scale building type imported from America was exploited through its enveloping surface: it was both a plea for 'truth' in architectural language and an expression of the urban form through volume. Modern architects were as interested in an exterior expressing the interior as in the volumetric and objectual presence of the skyscrapers in giving shape to the city. In what concerns urban form, the skyscraper was delivered as an urban gesture, a structuring and formal landmark. Scale and objectual condition were the main arguments through which modern architects explored the role of skyscrapers in reshaping the city.

In this respect, it seems worth noting that, today, the objectual condition of large-scale buildings and

their independence from the interior is not simply a particular feature of bigness and its programmatic complexity and instability, as suggested by Koolhaas. Instead, it is first the result of a process through which architectural language came to prevail over the modernist plea for truth, concerning a general problem of form that extends back to the postmodern quest for a historically based architectural language. The postmodern search for a communicative architecture through the recovery of the classical repertoire of architecture discarded the correspondence between meaning and type. A high-rise building could be an office block and simultaneously evoke Italian medieval towers, as with Milan's *Torre Velasca* (1956–58), by the BBPR architectural partnership. Postmodernism destroyed the idea of typological unity, in which interior and exterior were one, reducing type to image and attributing to this image the communicative dimension of architecture.³⁹ The surface treatment of buildings in many of Herzog and de Meuron's designs is a good example of this postmodernist legacy and its exploration through contemporary discourses on art.

Thus, the problem of architectural language in the realm of bigness – its objectual condition and independence from the interior – concerns a general problem of form: it is first a problem that reflects the *a priori* rejection of the modernist formal preconceptions rather than a technical impossibility. The point to be made is that, beyond the symbolic meaning and message its architecture may or may not communicate, today, the intrinsic formal value of bigness for the city rests on scale and the objectual condition of the building – a fact the moderns themselves were well aware of.

It seems therefore reasonable to argue that the crux of the formal problem of bigness in terms of urban design extends back to the early European debate on the skyscraper. It lies in the presence of the building in the city and in its capacity to become an agent of information at the city *Grossform* level.

It is the exploration of this capacity in the contemporary European city that we would like to discuss now.

Three designs by Herzog and de Meuron

Having this early European debate on the skyscraper and urban form in mind, we may now return to the three designs by Herzog and de Meuron mentioned earlier in this article, and illustrate the possibilities opened up by bigness to rework formal specificities of the existing city and expand its typological principles.

In the case of Hamburg, the aim of the Elbphilharmonie building is to create a symbolic and programmatic centre to the 'HafenCity Hamburg', a project of urban expansion of the city centre. [Fig. 9] The building aspires to be an agent of consolidation and urban renewal fostering urban life in the surrounding neighbourhood. The strategy is twofold. In programmatic terms, it creates an exceptional and attractive mix of urban uses. In formal terms, it adopts the principle of monumentalisation of a building, creating a landmark signalling the centre of the new urban area of the harbour, which is to expand the centre of Hamburg.

In formal terms, bigness thus acts here in a rather 'classical' way. First, it explores the notion of centrality through the monumentalisation of a particular building. Secondly, through the emphasis on the form and scale of a singular building, the Elbphilharmonie gives continuity to the urban principle of Hamburg's city centre, expanding the city's *Grossform* with the same logic – an urban system generated by relationships between individual buildings or an individual arrangement of buildings dominated by those with exceptional programmes.

The continuity of the dialogue between the traditional city, modernism and bigness further resurfaces in the building's architectural form. The aim, the authors argued, was to create a 'crowning

symbol of the expansion of Hamburg's city centre towards the south into the harbour district along the shores of the River Elbe' by designing an 'iridescent, multifaceted crystal' with a broad 'undulating sweep' of roof, while the 'crystalline glass façades' were meant to reflect water and city, 'blending into optical illusions the surrounding area.'⁴⁰ These words recall Mies's as much as the design evokes Scheerbart's architectural visions and Taut's Expressionism, with their imagery of constant change, transmutation and apparent movement of form, and notion of *Stadtkrone*. The flaring light emanating from the building in Herzog and de Meuron's early three-dimensional visualizations is equally telling.

In the Berlin Zentrum design, the four large-scale buildings have no defined use, although they were thought of as 'condensed centres' of their surrounding urban areas. The main strategy lies at the urban level: to create a 'visible urban expression' or landmark to define a specific urban location, providing visual focus at the urban scale. [Fig. 10] The buildings were to be located around the Tiergarten, the park to the west of the Brandenburg Gate, at the junction of the main axis through the centre of Berlin, linking the Brandenburg Gate to the Museum Island to the east via Unter den Linden, and Ebertstrasse, running in a north-south direction. The intervention, with its central focus on the park, would thus signal the end of the central axis of old Berlin, extending the city centre to the west and making it visible from a distance.

Again, the design proposes a *Stadtkrone* for Berlin. A close architectural reference seems to be Mies's entry for the 1929 competition for Alexanderplatz, with its box-like buildings of different sizes loosely connected to one another around the roundabout. At the level of urban form, however, the strategy can be seen in the light of Berlin's twentieth-century urban history, during which time the idea of city crown continually arose as a main design argument, from Behrens's 1912 statements to the paradigmatic

cases of the 1957–58 Hauptstadt Berlin international competition and the early 1990s competitions for Potsdamer Platz and Alexanderplatz.⁴¹

In strictly formal terms, then, the Berlin Zentrum design means the continuity of the discourse on Grossform and belief in the capacity of large-scale architectural structures to endow the city with some kind of formal intelligibility and unity.

The same can be argued with regard to the Triangle building for Paris. The main strategy of the high-rise multifunctional building, to be built in the Paris Expo area, lies in the urban principles that characterise Paris's urban design: its broad axes, open axial views, focal points and monumental buildings rising above the organic cohesion of the urban tissue. [Fig. 11] Today, the Expo area, together with the peripheral boulevard, constitutes a rupture between Haussman's fifteenth district to the north and the communities of Issy-les-Moulineaux and Vanves to the south. The intervention in public space and the location of the high-rise building aim at solving this problem by restoring the continuity between Avenue Ernest Renan, to the south of the Porte de Versailles, and Rue de Vaugirard to the north. This re-establishes the historical radial axis that leads to the city centre. The extensive façade, positioned along Avenue Ernest Renan, is intended to strengthen the axis and diminish the presence of the peripheral boulevard. [Fig. 3]

The strategy is essentially the same adopted by Le Corbusier in the project for Porte Maillot, with a similar position beside the peripheral belt. Like Le Corbusier's pair of skyscrapers, the high-rise building is to be perceived at the metropolitan scale. Its silhouette – an axial focal point – lends visibility to the Porte de Versailles, integrating and giving continuity to the system of axes and monuments of the Parisian urban design. The comparison of these two cases with the late 1950s urban strategy for La Defense is instructive. Although extending

the Champs-Élysées axis outwards to the west, La Defense generates a *Stadtkrone* outside the city core that is alien to the design of the existing city and radically alters its *Grossform*. The Porte Maillot and the Triangle, in contrast, recognise the urban principles of the city based on axes and monumental focal points, and adopt them as a design strategy at the metropolitan scale in an attempt to establish continuity with the peripheral fragmented urban tissues.

Thus understood, each of these designs by Herzog & de Meuron establishes a strategy of formal and typological continuity with the existing city, re-equating arguments of the modernist discourse in new contemporary contexts.

Conclusion

The first conclusion suggested by these three designs is that the symbolic meaning of bigness may vary and even be absent. There is not a correspondence between meaning and type. The early European explorations into the skyscraper design are framed by the modernist attempt to replace the correspondence between architectural classical vocabulary and symbolic meaning with a new system of significance based on industrial building techniques and allegedly timeless aesthetic values, as reflected in the double role of the glazed façades. It was, nevertheless, based on a correspondence between meaning and type. Both Mies and Le Corbusier conceived of their skyscrapers as office buildings to be integrated into the 'cité des affaires', symbol of a new modern era and urban expression. With postmodernism, the double communicative role that the moderns ascribed to the enveloping skin came to an end, together with the correspondence between meaning and type. Today, meaning can lie in an exceptional programme, as in the Elbphilharmonie. But given the end of the idea of typological unity, the specific contribution of bigness lies not so much in meaning, but in the possibilities of form opened up by scale—its intrinsic



Fig. 9: Jacques Herzog and Pierre de Meuron. Elbphilharmonie, Hamburg, Germany, 2003–2017. Site plan: authors.



Fig. 10: Jacques Herzog and Pierre de Meuron. *Ideen für das Herz einer Großstadt – Berlin Zentrum*, 1991.
Photomontage: Herzog & de Meuron.

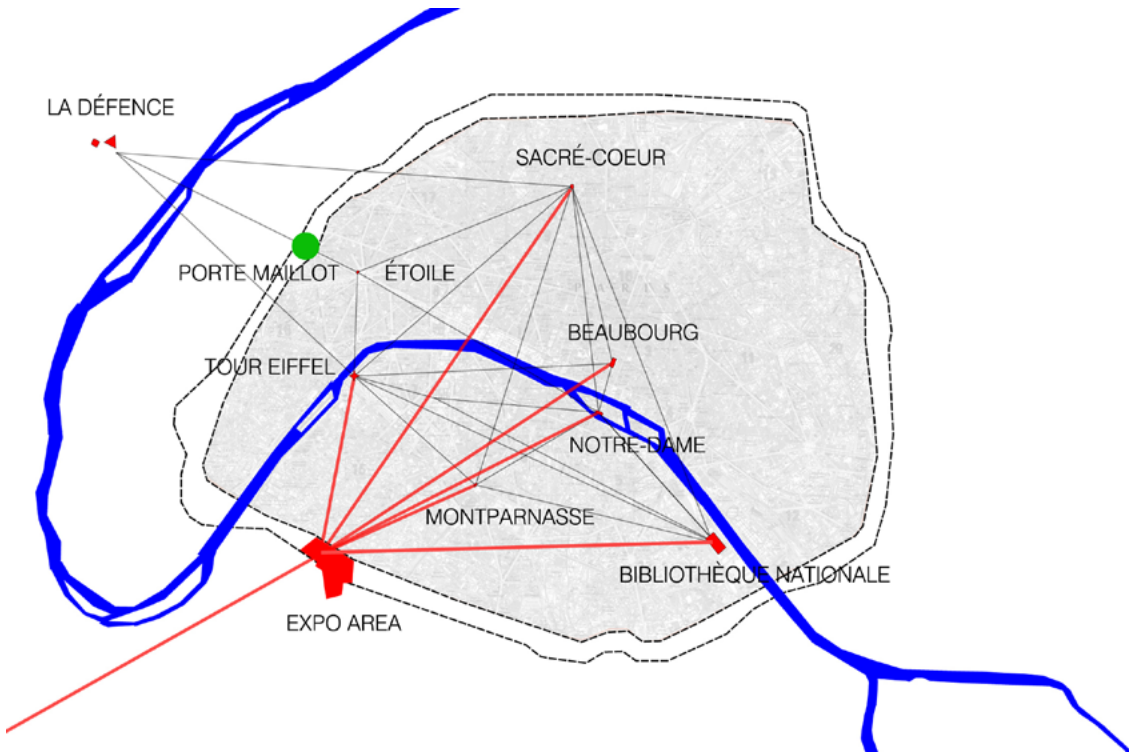


Fig. 11: Jacques Herzog and Pierre de Meuron. Relationship between the site and Paris's urban landmarks and axes. Photomontage: Herzog & de Meuron (Porte Maillot site, our mark).

characteristic—as in the Berlin Zentrum design and the Triangle building. With bigness, architecture is mostly confined to the objectual value of the building in shaping specific urban contexts. Herein lies the value of bigness for urban form.

This leads us to the second conclusion illustrated by the cases discussed above: that the possibilities afforded by scale do not forcibly jeopardise the existing city. When strategically planned and conceived of as part of a comprehensive composition of architecture and cityscape, i.e., in terms of *Stadtlandschaft*, bigness can integrate and enter into a dialogue with the formal and typological principles of the existing city, reinforce them, and reintroduce the possibility of thinking of the city in terms of *Grossform*. The Elbphilharmonie building adopts the principles of the historical city enlarging the centre of Hamburg by expanding its *Stadtkrone*. The Berlin design explores bigness as a tool to rework the latent *Grossform* implied by the horizontal city. The Parisian case explores bigness as a focal point associated with a boulevard, restoring and expanding the typological principles of Parisian urbanism. These cases seek a dialogue with context and urban type rather than to deliver bigness to the realm of the 'generic city'.

The third conclusion is that bigness can be seen as continuing the modern debate on the skyscraper and urban form. The Elbphilharmonie continues the debate on the *Stadtkrone*, as the proposal for *Berlin Zentrum*, continuing a debate on Berlin's urban design which has lasted for more than a century. As for the Triangle, it explores the urban principles of Paris in the same way Le Corbusier had explored in the Porte Maillot project, aiming at structuring the generic city in the suburbs by reworking identity values of the city core's urban typology.

As these cases illustrate, bigness provides an important tool in the design of the *Grossform* of the contemporary European city. The aim is not a

return to the modernist dream of 'total planning', but to secure a large-scale, dominant form through typological values within which there is place for the 'spontaneous' processes of the various urban actors.

This approach to bigness in terms of the city *Grossform* is by no means restricted to these cases and their geographic, typological and cultural specificities. Within the varied contexts and scales of the contemporary city, bigness can mark urban centres and exceptional programmes in the multi-centred metropolis, establish dialogues with the natural surroundings, or define urban limits.

Thus understood, bigness reopens the debate on the grand-scale form of the city that had been put aside by postmodern critique. The large gestures made possible by bigness can be seen as a structuring tool of the 'collage city'. Through its objectual condition, bigness becomes a landmark or urban referent rendering legibility to the city. In this sense, it operates in phenomenological terms in a similar way to Lynch's Gestalt principles. But since phenomenological approaches per se are incapable of providing the city with a coherent urban structure, the operative dimension of bigness seems to depend on its links with the specificities of the existing city. As in cities such as those discussed here, bigness may establish a dialogical relationship with the existing urban principles, whether through continuity, transformation or subversion, providing a methodological basis that goes beyond the architectural object to encompass its full potential as a link between architectural and urban form.

Notes

1. Kevin Lynch, *The Image of the City* (Cambridge, MA: The Technology Press, Harvard University Press, 1960); Alan Colquhoun, 'The Superblock' (1971), in *Essays in Architectural Criticism: Modern Architecture and Historical Change* (Cambridge, MA: MIT Press, 1985), 96–97.
2. Aldo Rossi, *The Architecture of the City*, trans. Diane Ghirardo and Joan Ockman (Cambridge, MA: MIT Press, 1982 [1966]); Colin Rowe and Fred Koetter, *Collage City* (Cambridge, MA: MIT Press, 1978).
3. Rem Koolhaas, *Delirious New York: A Retrospective Manifesto for Manhattan* (New York: The Monacelli Press, 1997 [1978]); Rem Koolhaas, 'Bigness, or the Problem of Large. Manifesto, 1994', in O.M.A., Koolhaas and Bruce Mau, *S,M,L,XL*, (Cologne: Benedikt Taschen Verlag, 1997), 495–516; Rem Koolhaas, 'The Generic City', in *S,M,L,XL*, 1239–1264.
4. Rafael Moneo, 'On Typology', *Oppositions* 13 (Summer 1978): 22–45.
5. On the influence of America on European modernism see Jean-Louis Cohen and Hubert Damisch, eds., *Américanisme et modernité: L'Idéal américain dans l'architecture* (Paris: Flammarion, École des Hautes Études et Sciences Sociales, 1993); Jean-Louis Cohen, *Scenes of the World to Come: European Architecture and the American Challenge 1893–1960* (Paris and Montreal: Flammarion and Canadian Centre for Architecture, 1995). The radical positioning of Koolhaas – proper for a manifesto – leads him to assert that 'Bigness has been, for nearly a century, a condition almost without thinkers.' Yet the diversity of contexts and discourses on mixed-use large-scale built structures is larger than Koolhaas seems willing to accept. The last century is precisely the one during which the problem of bigness emerged as a central theme of urban design and architecture, from the early debates on the skyscraper to the megastructures of the Team X, Situationists and Metabolists.
6. On the Elbphilharmonie see *El Croquis*, no. 129–130 (2006): 436–445.
7. The project was developed with the collaboration of the conceptual artist Rémy Zaugg, which is apparent in the solution of the façades, reworked in later designs by the authors. See Alejandro Zaera, 'Continuities: Interview with Herzog and de Meuron', *El Croquis* XII, no. 60 (1993): 6–23.
8. On the Triangle building see Nobuyuki Yoshida, 'Herzog & de Meuron: Project Triangle in Paris by Herzog & de Meuron', *Architecture and Urbanism. Sustainable Architecture in Germany*, no. 459 (December 2008): 7; Herzog and de Meuron, 'Triangle Building', *El Croquis*, no. 152–153 (2010): 322–329.
9. Banham, *Megastructure: Urban Future of the Recent Past* (New York: Harper & Row, Icon Editions, 1976), 9.
10. On the German and French reception of the skyscraper see Francesco Passanti, 'The Skyscrapers of the Ville Contemporaine', *Assemblage*, no. 4 (October 1987): 52–65 and a different version of this essay published in Cohen and Damisch, *Américanisme et Modernité*, 171–190.
11. On the Parisian and Berlin urban contexts and debates on urban planning see Anthony Sutcliffe, *Towards the Planned City* (Oxford: Blackwell, 1981); Norma Evenson, *Paris: A Century of Change, 1878–1978* (New Haven: Yale University Press, 1979); Evenson, 'Paris, 1890–1940', in *Metropolis 1890–1940* ed. Anthony Sutcliffe, (Chicago: Chicago University Press, 1984), 259–288; Horst Matzerath, 'Berlin, 1890–1940,' in Sutcliffe, *Metropolis*, 289–318; Vittorio Magnago Lampugnani, 'Berlin Modernism and the Architecture of the Metropolis,' in Terence Riley and Barry Bergdoll, eds., *Mies in Berlin* (New York: The Museum of Modern Art, 2001), 34–65.
12. Passanti, 'Skyscrapers'.
13. On the influence of the American debate on parks in France and Germany see Cohen, *Scenes of the World to Come*, 26–31.
14. Auguste Perret, 'Une maison de dix étages. Terrasse fleurie. L'Hotel des Sportsmen', *La Patrie* (21 June 1905), 3, quoted in Passanti, 'Skyscrapers', 56.
15. On Eugène Hénard see his *Études sur l'architecture et les transformations de Paris, et autres écrits sur l'architecture et l'urbanisme* (Paris: Éditions de la Villette, 2012).

16. On the competition for Greater Berlin see Wolfgang Sonne, *Representing the State: Capital City Planning in the Early Twentieth Century* (Munich, Berlin, London, New York: Prestel, 2003), 101–148.
17. The results of the competition were decided in 1910, awarding two first prizes, one to Hermann Jansen and the other to Joseph Brix and Felix Genzmer.
18. Karl Scheffler, 'Der Kampf um Bismarck', in *Kunst und Künstler*, vol. 10 (1911–1912), quoted in Sonne, *Representing the State*, 105.
19. For a general approach to Ferdinand Tönnies's 1887 *Gemeinschaft und Gesellschaft*, Georg Simmel's 1903 'Die Grossstädte und das Geistesleben' (Metropolis and Mental Life), and the sociological and artistic debate on Germany in this period see Francesco Dal Co, *Figures of Architecture and Thought: German Architecture Culture 1880–1920* (New York: Rizzoli, 1990); Mitchell Schwarzer, *German Architectural Theory and the Search for Modern Identity* (Cambridge and New York: Cambridge University Press, 1995), 146–52.
20. The competition included the surrounding cities of Charlottenburg, Schöneberg, Rixdorf, Wilmersdorf, Lichtenberg, Spandau and Potsdam, as well as more than 200 villages in the districts of Teltow and Nieder-Barnin.
21. Katharina Borsi, 'Drawing the Region: Hermann Jansen's Vision of Greater Berlin in 1910', *The Journal of Architecture* 20, no. 1 (2015): 47–72.
22. George R. Collins and Christiane Crasemann Collins, *Camillo Sitte: The Birth of Modern City Planning* (New York: Dover Publications, 1986), 107–10. The seminar debates were published in the periodical *Städtebauliche Vorträge, gehalten im Seminar für Stadtbau an der Kgl. Technischen Hochschule zu Berlin*, I-X, 1908–20.
23. Jean-Louis Cohen, 'In the Cause of Landscape,' in Cohen, ed., *Le Corbusier: An Atlas of Modern Landscapes* (London: Thames & Hudson, 2013), 35–36.
24. Mies van der Rohe, quoted in Passanti, 'Skyscrapers', 55; Lampugnani, 'Berlin Modernism', 40; Cohen, 'German Desires of America: Mies's Urban Visions,' in *Mies in Berlin*, 363.
25. Karl Scheffler, *Die Architektur der Großstadt* (Berlin: Bruno Cassirer Verlag, 1913), 14, quoted in Cohen, *Scenes of the World to Come*, 31.
26. Mendelsohn's photograph of Lower Manhattan was published in his *Amerika* (Berlin: Rudolf Mosse, 1926). For a reproduction of Bilinsky's advertising see Regina Stephan, ed., *Eric Mendelsohn: Architect 1887–1953* (New York: The Monacelli Press, 1999), 66.
27. The seminal essay on the significance of aesthetics for Le Corbusier's urban design remains Passanti, 'The Aesthetic Dimension in Le Corbusier's Urban Planning', in *Josep Lluís Sert: The Architect of Urban Design, 1953–1969*, ed. Eric Munford, Hashim Sarkis, and Neyran Turan (New Haven: Yale University Press, 2008), 25–37. On the vital influence of Germany in Le Corbusier's urban design see Christoph Schnoor, *Le Corbusier, La Construction Des Villes, Charles-Edouard Jeanneret's Erstes Städtebauliches Traktat von 1910/1911* (Zurich: Gta Verlag, 2008).
28. On Le Corbusier's plans for Paris and the French tradition see Barry Bergdoll, 'Paris: Le Corbusier and the Nineteenth-Century City', in *An Atlas of Modern Landscapes*, 246–49.
29. Le Corbusier, *Le Corbusier et Pierre Jeanneret, Œuvre Complète 1929–1934*, vol. 2 (Zurich: Girsberger, 1934), 63–65.
30. *Ibid.*, 90; Passanti, 'Aesthetic Dimension', 27.
31. Colin Rowe, 'Chicago Frame' (1956) in Rowe, *The Mathematics of the Ideal Villa and Other Essays* (Cambridge, MA: MIT Press, 1987), 89–117.
32. *Le Corbusier, Le Corbusier et Pierre Jeanneret, Œuvre Complète 1929–1934*, 92. In *Urbanisme*, for example, Le Corbusier published a photograph of the frame of an American skyscraper under construction with the caption 'A building ... we envelop it with glass'. Le Corbusier, *Urbanisme* (Paris : Éditions Vincent, Fréal & Cie, 1966 [1925]), 185.
33. Le Corbusier, 'La leçon de la machine,' *L'Esprit Nouveau*, no. 25 (1924), no page numbers.
34. Although the Ville Contemporaine dates to 1922, Le Corbusier had published the design of the skyscrapers in January 1921 in *L'Esprit Nouveau*. The magazine

- was known in Germany, and Le Corbusier had personally sent the issue to various German architects. Passanti, 'Skyscrapers', 60–61; Le Corbusier, 'Trois rappels à MM. les architectes: le plan,' *L'Esprit Nouveau*, no. 4 (January 1921): 465–466.
35. Mies van der Rohe, no title (1922), trans. Mark Jarzombek in Fritz Neumeier, *The Artless Word: Mies van der Rohe on the Building Art* (Cambridge, MA: MIT Press, 1991), 240.
 36. Lampugnani, 'Berlin Modernism,' 43.
 37. Mies, no title, 240. In 1968 Mies reaffirmed his intentions, writing on his 1921 design: 'Because I was using glass, I was anxious to avoid enormous dead surfaces reflecting too much light, so I broke the façades a little in plan so that light could fall on them at different angles: like a crystal, like cut-crystal.' On the second design: 'I tried to work with small areas of glass and adjusted my strips of glass to the light and then pushed them into the plasticine planes of the floors. That gave me the curve ... I had no expressionist intention. I wanted to show the skeleton, and I thought that the best way would be simply to put a glass skin on.' 'Mies Speaks', *Architectural Review* (December 1968), quoted in Frank Russell, ed., *Mies van der Rohe, European Works* (London; New York: Academy Editions; St. Martin's Press, 1986), 38, 40.
 38. This symbolism ascribed to glass had obvious links with German mysticism and the idealisation of Gothic architecture of authors such as Wilhelm Worringer and Scheffler. See Rosemarie Haag Bletter, 'Paul Scheerbar's Architectural Fantasies', *Journal of the Society of Architectural Historians* 34, no. 2 (May 1975): 83–97; Bletter, 'The Interpretation of the Glass Dream – Expressionist Architecture and the History of the Crystal Metaphor', *Journal of the Society of Architectural Historians* 40, no. 1 (Mar 1981): 20–43.
 39. Moneo, 'On Typology', 39.
 40. Herzog and de Meuron, 'Elbphilharmonie, Hamburg', *El Corquis* no. 129–130 (2006): 441.
 41. On the international competition Hauptstadt Berlin see Helmut Geisert, Doris Haneberg, and Carola Hein, *Hauptstadt Berlin: Internationaler Städtebaulicher Ideenwettbewerb 1957/58* (Berlin: Gebrüder Mann

Verlag, 1999), esp. 157–192. The entries for the competitions launched in the early 1990s for Berlin were widely published. See, for example, the special issue *Domus Dossier 3, Berlin* (1995).

Biographies

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Calling Rowe: After-lives of Formalism in the Digital Age

Stylianos Giamarellos

Emmanuel Petit recently invoked the work of Colin Rowe in an article he published in the 'New Ancients' issue of *Log* in 2014. In her editorial note, Cynthia Davidson introduced Petit and the other contributing authors as united in their desire to 'shift the ground of the architectural discussion'. They would do so by thematising contemporary invocations of precedent. In this shared spirit, Petit's 'Spherical Penetrability: Literal and Phenomenal' addressed both methodological/epistemological and architectural/empirical issues. Petit drew from Rowe's formalist analyses in 'Transparency: Literal and Phenomenal', the seminal article the British theorist had co-authored with Robert Slutzky in 1963. Petit's argument is twofold. His epistemological discussion focuses on updating Rowe's method of formal analysis for the present. This epistemologically updated formalism then yields empirical results. It enables Petit to posit a novel genealogy of relevant architectural precedent for the digital age.¹ Updating Rowe therefore allows a discussion of precedent to successfully re-enter current discourses of digital architectural production. These renewed threads of continuity with the past would render the novel architectures of digital design practices intelligible and debatable.

For many digital practitioners today, this is a noble cause. To cite just one example, the main proponent of parametricism, Patrik Schumacher, recently found the conceptual and theoretical discourse of digital design practices lacking in clarity and sophistication. Novel attempts to conceptualise the forms produced by the practitioners in the digital field are

therefore welcome.² In other words, Petit's attempt to update Rowe addresses an existing gap in digital design discourse. In his eyes, the British theorist's methods of formal analysis are apposite for the task at hand. After all, Rowe's studies were originally informed by (and often established meaningful relations with) architectural precedent.

Implications of an invocation

Rowe's work was inspired by Rudolf Wittkower, his mentor at the Warburg Institute from 1945 to 1947. Wittkower's study of eleven villas designed by the Renaissance architect Andrea Palladio within approximately fifteen years (from the early 1550s to the late 1560s) uncovered the 'single geometrical formula' that underlay their design. Purging their individual differences, the German art historian's formal analysis of the plan drawings posited that the eleven villas were variations on the same theme. Wittkower heralded this 'systematisation of the ground-plan' in the form of the nine-square grid (more specifically, a rectangle divided by two longitudinal and four transversal axes) as the distinctive characteristic of Palladio's villas. The Renaissance architect's 'grouping and re-grouping of the same pattern' in turn rested on harmonic relations between the parts and the whole. Wittkower therefore asserted that 'this demand of the right ratio... [was] at the centre of Palladio's conception of architecture'.³ In other words, the nine-square grid was loaded with the metaphysical luggage of Renaissance humanism.

In his subsequent studies, Rowe went one step further. He applied Wittkower's analyses of Renaissance architecture to celebrated projects of modern architecture. Starting from his seminal article on 'The Mathematics of the Ideal Villa' in 1947, Rowe exposed the Palladian roots of modernism. In so doing, he acknowledged the influence of Wittkower, and especially his recognition of 'a correspondence between the perfect numbers, the proportions of the human figure and the elements of musical harmony'.⁴ Notoriously describing Le Corbusier as 'the most catholic and ingenious of eclectics', Rowe uncovered the classical elements in a design movement that purported to have broken its ties with the history of architecture.⁵ His analytical diagrams that compared Palladio's Villa Malcontenta and Le Corbusier's Villa Stein exemplified his formalist approach at work. The nine-square grid and its internal A-B-A-B-A division soon became an indispensable tool for this sort of analysis.⁶ Rowe's studies thus demonstrated the incipient classicism of modern architecture. His analytical method showed that the modernist designers' aspirations to timelessness could only stand on the common ground of architectural classicism. The supposedly ahistorical, rational, and autonomous movement was part of a longer classical tradition. This shift in the understanding of modernism rendered the past relevant for the present again. Modernist practitioners did not design in the historical vacuum of a *tabula rasa*. Less ground-breaking and inventive than they claimed, their work was just the latest episode in the history of classicism. It was the youngest family member in a long genealogy of precedents.

Petit's invocation of Rowe aspired to exert a similar effect on contemporary practitioners who propagate the novelty of the digital paradigm. To support his invocation of formalism, Petit attempted to draw a subtle line of continuity. He presented some of Rowe's main insights as precursors to both the postmodern debates of the late 1970s, and the

Deleuzian discussions of striated space and the fold in the early 1990s.⁷ In tracing Rowe behind the post-modern discussions in architecture, Petit was not alone. Many scholars and practitioners had already located the seeds for the development of postmodern thinking both in Rowe's formalist studies and in his promotion of a contextualist collage approach to the city in the late 1970s.⁸ Tracing Rowe behind the formal discussions of 'Deleuzian' folds in the 1990s was more controversial. However, Petit's argument was at least supported by the major evangelist of folding in architecture, Greg Lynn. In 1994, Lynn focused on 'The Variations of the Rowe Complex' to further promote his proposed shift to 'anexact' and 'pliant' geometries in digital design practice. In any case, if Petit's argument holds, then Rowe's formal analysis is just a step away from entering the digital era. It is up to architectural historians and theorists to provide the only jigsaw piece that would still need to fall into place. It is they who need to use their conceptual imaginations to construct corresponding threads of continuity between past and present.

However, as I will show in what follows, this is neither entirely the case, nor the end of the story. In his broad sweep, Petit was quick to trace Rowe's ideas behind the major architectural debates from high modernism to the early digital pursuits of the 1990s. In so doing, he glossed over significant developments in architectural theory over the last five decades. Rather incidentally, a similar rhetorical tactic had also been employed some years earlier by the proponents of parametricism. In the first parametricist manifesto of 2008, Zaha Hadid and Patrik Schumacher argued that 'Postmodernism and Deconstructivism were transitional episodes that ushered in this new research programme based upon the parametric paradigm'. They then heralded this programme as 'the great new style after Modernism'. Hadid and Schumacher clearly intended to establish a strong link between parametric design and modern architecture. In this framework, the multifarious implications of the

intervening postmodern critique no longer needed to be considered.⁹ Petit's invocation of Rowe's early formalism had similar implications. However, if the postmodern critique was to be seriously considered, then an update of Rowe's formal analysis for the digital age would constitute only an insufficient first step.

'Spherical penetrability' is Petit's own novel concept of formal analysis to stand in for Rowe's cubist 'transparency' of 1963. [Fig. 1] Through this novel concept, Petit claims to have successfully recalibrated contemporary digital architectures within their own historical horizon of precedents. As these designs in turn become family members in another genealogy of precedents, history regains its relevance for the digital age. Just like the modernists' claims that went before them, the neo-positivist assertions of autonomy of digital design practices are therefore undermined. This is the outline of Petit's argument. However, the story of the possible digital afterlife of Rowe's formalism is more complicated than suggested by Petit. In what follows, I will revisit the richer history of the after-lives of Rowe's formalism both as an analytical/historical and generative mechanism for architectural design. This will in turn enable me to sketch the conditions of possibility for an update of his formalism in the digital age.

Residual humanism

Petit rightly notes that Rowe and Slutzky's method of formal analysis was mainly informed by the modernist practice of analytical cubism. That the mathematics underlying Rowe's formalism rest on explicitly Cartesian grounds, however, left him unperturbed. In addition, Rowe's invocation of Platonic solids echoed Pythagorean associations of harmonic relations and ideal proportions that his mentor, Wittkower, had already noted in his previous studies. Rosalind Krauss's description of grids as myths (that allowed 'a contradiction between the values of science and those of spiritualism to

maintain themselves within the consciousness of modernism, or rather its unconscious, as something repressed') therefore applies to Wittkower's and Rowe's work, as well.¹⁰ For Wittkower, this metaphysical luggage lay outside the architectural objects. It was to be found in the religious texts that described the universal harmony of Christian cosmology, for instance. It was the textual sources outside architecture that revealed the essential meaning of the deep structures of a building's form, in relation to human figuration, perfect numbers, musical harmony, the ideal relations of parts to wholes, etc. All these residual humanist features in the luggage of analytical formalism render an update of Rowe for the present more complicated than Petit suggests. Their subtle presence behind the 'mythical' function of the grid renders his project inconsistent. Digital architectural practitioners have often explicitly framed the novelty of their endeavour in posthumanist terms.¹¹ However, the residues of Renaissance humanism linger in the background of even the most extreme approaches to formalism by Rowe's disciples. Because the contemporary digital architects' assertions of autonomy historically developed from these roots, these residues still haunt their practices. The multiple after-lives of Rowe's formalism from the postmodern to the digital age help explicate this paradox of residual humanism behind the posthumanist rhetoric of current practitioners.

In a 1973 addendum to 'The Mathematics of the Ideal Villa', Rowe defended his formalist methodology of analysis through the grid. He praised 'the merit of appealing primarily to what is visible and of, thereby, making the minimum of pretences to erudition and the least possible number of references outside' the object of analysis. Echoing the flourishing tradition of close reading in literary studies, this in turn rendered his formalist method of analysis more accessible than other approaches.¹² At the same time, Rowe's formalism of the grid meant that the present could only converse with

the past in abstract, syntactic terms. At its core, the outlook of his discussion was therefore clearly modernist. Going a step further, Alina Payne argued that this shared 'ontological matrix' in Wittkower's and Rowe's analyses was aligned with Siegfried Giedion's modernist historiographical project. In other words, Wittkower's study also served as a subtle legitimization of Giedion's historical account of modernism as a movement that abandoned the Gothic to favour the Renaissance. Hence, Wittkower's and Rowe's work offered Giedion 'the possibility of a homogenous architectural discourse [that] rescue[d] the Renaissance ... as a viable thinking ground for the further development of contemporary discourse'.¹³ This alignment of shared concerns and interests with Giedion may be an additional reason behind the celebrated reception of Wittkower's and Rowe's analyses. In the final instance, the grid, its use and its appropriation in different historical epochs was not so much the concern of the original historical agents. More than anything else, it was the modern lens through which Rowe could enact his correspondences between past and present. In other words, Rowe's formal analysis was carried out from a modernist perspective, and this historically remained the case in its various versions from Wittkower to Eisenman.

Autonomy

In the words of Rosalind E. Krauss, the grid is the emblem of modernity, 'the form that is ubiquitous in the art of [the twentieth] century, while appearing nowhere, nowhere at all, in the art of the last one'.¹⁴ It is the syntactic device through which the architecture of the past makes sense to the eye of the modern beholder. Looking for it, as the modern observers currently understand it, in the architectures of the past is therefore only anachronistic. Rowe's grid says more about the modernist outlook to the past, and less about the historical reality of this past. This is also why, although both Wittkower and Rowe were adept at highlighting contextual details and meaningful differences, their analyses do not

fundamentally rest upon them. The invisible 'deep' order of the grid supplants the contextual details to connect the architectures of different ages on an ideal bridge of syntactic concerns. These remain shared beyond the only superficially irreconcilable differences in the architectures of the different ages. Krauss was therefore right to describe the grid as a form that excludes contextualist concerns, 'a paradigm or model for the antidevelopmental, the antinarrative, the antihistorical'. This is how Rowe's and Wittkower's grids could also point to the autonomy of the architectural object, despite their specific humanist luggage. The diagrammatic grids primarily served as a 'staircase to [an idealised] Universal'.¹⁵

Emphasising this autonomy of architectural form, Peter Eisenman, a disciple of Rowe at the University of Cambridge from 1960 to 1963, pushed his mentor's approach to its limits. In his doctoral dissertation, Eisenman set out to explore the formal basis of (any) architecture. He did so through his studies of the 'generic plan types' of eight iconic modernist projects by Frank Lloyd Wright, Alvar Aalto, Le Corbusier and Giuseppe Terragni.¹⁶ Whereas Rowe's comparative analyses aimed to underline the ties of modern architecture to the classical historical precedent, Eisenman's approach was explicitly anti-historical. It deliberately 'supress[ed] perceptual considerations' and eschewed the iconographic and symbolic content of architecture. His formalism intended 'to consider buildings as a structure of logical discourse, and to focus attention on consistency of argument, on the manner in which spatial and volumetric propositions may interact, contradict, and qualify each other'.¹⁷ Pushing the analytical autonomy of his predecessors' studies even further, Eisenman asserted that 'the inherent order derives from a geometric reference, from the properties of the form itself'.¹⁸ In this context, the properties of the 'abstract entity' of the grid were crucial. 'Thought of as a continuum [the grid] provide[d] the absolute reference for

	1963 "PHENOMENAL TRANSPARENCY"	2014 "SPHERICAL PENETRABILITY"
POSITION OF ANALYST	exterior to spatial diagram	interior to spatial diagram
SPATIALITY OF ANALYSIS	2.5-dimensional stratification of space	volumetric/spherical onion rings
LOGIC OF TRANSPARENCY	invariable resolution/clarity/definition throughout deep space	"bulge": gradual loss of definition from inside out
FUNDAMENTAL GEOMETRIC DISTINCTION	9-versus 4-square	centripetal versus itinerant

Fig. 1: Comparative matrix of the characteristics of Rowe's phenomenal transparency in 1963 and 2014 by Emmanuel Petit. Source: *Log* no. 31 (Spring/Summer 2014): 38.

architectural form' and 'the frame of reference for all perception'.¹⁹ Unlike Wittkower and Rowe, in his study Eisenman employed the grid as an analytical tool not only in two, but in three dimensions. His axonometric drawings for the Casa del Fascio exemplify this approach. Slicing the building in a series of vertical planes of reference for his analysis, Eisenman contrasted the 'internal' exigencies of architectural form in their clash with the 'external' functional requirements of circulation in space.²⁰

However, Eisenman did not stop at the analytical side of Rowe's formalism. In his subsequent work, he eschewed his mentor's turn to the past to explore this method as a generative mechanism of autonomous architectural form. In his House Series from 1969 to 1978, Eisenman pursued architecture as an autonomous language with its own deep syntactic rules. He deliberately attempted to design the House projects in a way that did not primarily answer to function or any other 'external' determinant of architectural form. Starting from House II (1969–1970), in the hands of Eisenman the nine-square grid served to reveal a deep syntactic structure. It enabled him to explore and explicate a series of 'internal' dynamics, the displacements, rotations, tensions, and compressions of ideal volumes, planes, and lines that gave rise to architectural form. By then, Eisenman's autonomous language of architecture had pushed Rowe's formalist approach to its unexpected extremes.²¹

In 1976, Eisenman theorised his design approach in the novel terms of a 'post-functional' architecture. No longer driven by the human-centric concerns of both functionalism and classicism, this approach instead centred on 'a dialectical relationship between the evolution of form itself'. For Eisenman, architectural form was generated by two internal tendencies that operated at the opposing ends of a spectrum. One tendency developed from the complex transformation of a simpler (Platonic) solid. The other originated in a simplifying

decomposition of more complex and fragmentary spatial entities. These served as ready-made unspecified phrases of a language of architecture that remained 'independent of man'.²² However, by the end of the 1970s and the rising postmodern critical discourses, it also seemed that the approach Eisenman had developed for his House Series had reached a dead end. His pursuit of a completely autonomous 'internal' language of architecture was an inconsistent project.²³ Inspired by the poststructuralist critiques of Michel Foucault and Jacques Derrida, in his later work Eisenman moved away from his formerly abstract and purified formalism. In so doing, he reconsidered the role of 'external' factors like the marks and traces of history and memory in the generation of architectural designs.²⁴ Eisenman's eventual rejection of Rowe's formalism also marked a wider declining interest in the British theorist's studies over the years that followed.

Although Eisenman eventually abandoned his formalist project of autonomy, contemporary proponents of parametricism now acknowledge not only the limitations, but also the merits of his work. To cite just one example, Schumacher notes that 'purely' formal experimentations like Eisenman's are necessary, as their results are not restricted in the 'internal' domain of formal exploration. As demonstrated by Eisenman's House Series, the unpredictable results of these 'internal' investigations often lead practitioners to reconsider functional 'externalities', as well. Their development is therefore significant for the discipline. They are not just 'irrational' or inconsequential 'eccentricities'.²⁵ This view is aligned with Eisenman's own understanding of post-functionalism, an approach that had often been portrayed as indulgent and devoid of critical social concerns. Back in the 1970s, Eisenman claimed that his design experiments produced 'defamiliarising' spatial conditions that in turn challenged or questioned societal or disciplinary norms. This was where the supposedly absent criticality of his formalist projects was to be found. As a critique of

architecture, his projects also became a critique of the society that produced it. Following a similar line of thinking, Schumacher posits that the investigation of 'eccentric' form is still relevant for the current generation of digital practitioners. He encourages them to resist the complete surrender of formal explorations to 'external references', like socio-political and economic factors.²⁶ In his own words, current digital practitioners seek a synthesis of the 'internal' with the 'external' in what can possibly be called an integrated formalism for the present.

Whether the synthesis the digital practitioners claim to demand is at all possible, however, is another question. It essentially means reconciling formalism with what has historically been understood as its opposite, i.e. a variant of contextualist discourse. Although in opposition, these discourses historically developed as intertwined in the post-modern age. Insofar as no 'internal' account of architecture can account for its 'external' historical success, there is no escaping a minimal form of contextualism. The development of diverse variations of formalism over the course of the twentieth century also suggests that, far from staying autonomous, formalisms are also contextual.²⁷ It is for the same reason that Eisenman's project arrived at a cul-de-sac. Formalisms can certainly be a *posteriori* analysed and understood in relation to the historical and cultural contexts of their production. For instance, Eisenman's was not only an extreme response to the discipline's 'internal' problems, like simplistic functionalism and the prolonged impasse of modern architecture from the 1960s onwards. As Sean Blair Keller (2005) recently argued, it was also a product of its time. It cannot be thoroughly understood outside the postwar pursuit of 'systems aesthetics' and the early attempts of computerising the design process at the University of Cambridge in the 1960s.²⁸ What is less clear is whether formalisms can also prove generative, i.e. useful and useable by contemporary digital practitioners to further develop their design pursuits. The historical

trajectory of Rowe's own example suggests that, as generative mechanisms, the formalisms of the past have ended up with increasingly reductive results. The British theorist himself had already noted how the modernist forms of the New York Five (Peter Eisenman, Michael Graves, Charles Gwathmey, John Hejduk, and Richard Meier) were separated from their original ideological 'content' in his introductory text for their exhibition in 1972.²⁹

A generative mechanism for the digital age

As already noted, Petit's is not the first attempt to update Rowe's analytical formalism for the digital age. In the early 1990s, Greg Lynn effectively attempted a 'pliant' geometric synthesis of formalism with contextualism. Within this broader framework, Lynn was the first to discuss Rowe in the novel terms of the emerging digital discourses. A former student of Eisenman's who also started his career as an assistant in his practice, Lynn worked from within the same genealogy. More specifically, his thought developed from Rowe's eventual rejection of analytic formalism in favour of the contextualist collage approach. This was synonymous with political pluralism in the British theorist's writings in the 1970s.³⁰ Insofar as an architectural and urban form was still identified with forms of political life and organisation, however, Rowe's 'contextualist' approach still rested on formalising.³¹ In a similar fashion, Lynn's argument worked towards a formalist approach that could also address contextualist concerns. In his account, this could only be achieved when the mathematics that underpin Rowe's formalism were also updated for the digital age. Jettisoning the dated and rigid mathematics of the ideal villa, alongside their universalist allusions to timeless harmonic proportions, would enable Rowe's original questions of producing order and organisation in architectural form to regain their pertinence in the digital age.³²

For Lynn, Wittkower's and Rowe's understanding of geometry as 'mathematically exact and therefore

definable only through identically repeatable forms' obstructed the relevance of their formalisms.³³ The history of the early digital practices of architecture that included attempts to turn Rowe's approach to a generative design mechanism corroborated Lynn's argument. To cite just one example, George Hershey and Richard Freeman's *Possible Palladian Villas* involved the development of software that used Rowe's grids as a computational formal grammar. The software worked with multiple combinations of these grammatic elements to produce guaranteed harmonic results.³⁴ Obviously reductive, as well as limited by the same constraints that hindered Wittkower's and Rowe's formalism of the grid, the software could only produce a finite array of possible moves within a closed and predefined field. Digital design practices that followed Lynn's lead or Stan Allen's plea for an exploration of the 'field conditions' in architecture since then, have exposed the limitations of this model even further. As Allen memorably noted in 1997, 'all grids are fields, but not all fields are grids'.³⁵

Lynn's formalist project of replacing Wittkower's and Rowe's rigid and exact definitions of geometry with 'pliant, anexact' geometries can also be considered as the staple reply of digital practitioners to the critiques from the contextualist camp. Because the proposed geometries are anexact and pliant, Lynn's argument goes, they are versatile enough to accommodate all sorts of the contextual forces that shape or affect architectural form. In other words, the contextual forces are actively involved in the making of these geometries. They are integrated within the forms. This formalisation of socio-political forces thus seems to be rooted in Rowe's approach of politics in *Collage City*. However, critiques from the contextualist camp have not dissipated since then. The contextualists argue that, in the final instance, Lynn's is just a quantitative approach to their concerns whose specific qualities are irreducible to crude formalisation. In other words,

formalism and contextualism cannot be addressed in the same breath. Starting in the late 1990s, this debate has hardly progressed. Both sides keep accusing the other for missing the point. An air of irreconcilability prevails.

Integrated formalism

As this article has shown, Rowe's analytical formalism historically exerted a dual effect. It was not only followed by the historical and theoretical repercussions already discussed. In the hands of practitioners, it also became a generative mechanism for architectural design. [Fig. 2] This was a conscious endeavour on the part of Rowe. As the recollections of his students attest, he was looking to produce something useful for the present. For Rowe, history was not a foreign country, but a field integrated within the discipline of design.³⁶ This is how his approach served both as a novel historical understanding of modernism and as a trigger for postmodern developments. If contemporary attempts to update Rowe's formalism for the digital age seem lacking, it is because their authors have only invested in one of the sides of Rowe's dual project. Petit focuses on the backward-looking analytical/historical side of reintroducing lineages of precedent in digital architectural discourses. Lynn focuses on its forward-looking generative aspect in an attempt to reconcile it with digital architecture's promises of the 'new'. In his case, a discussion of historical precedent is ruled out from the outset. A successful update of Rowe's formalism for the present would therefore need to combine both these aspects at once. However, such a theoretical endeavour can no longer be exhausted in updating Rowe. As this article has shown, this would only perpetuate an effectively modernist outlook in a postmodern age. Hence, the parametricists' pretenses to autonomy and their irreverence for historical precedent would not be undermined. The modernist features inherent in Rowe's analysis would only reinforce aspects of the parametricists'

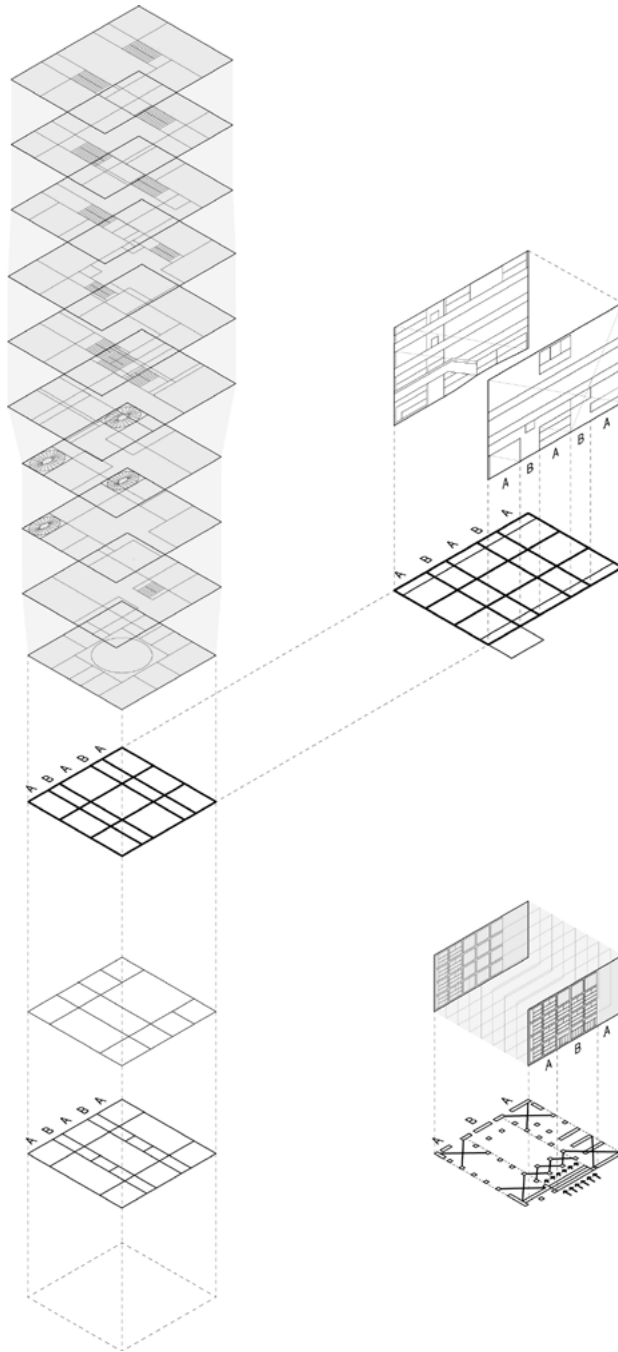


Fig. 2: Analytical and generative formalisms. (Clockwise from top) Abstracted from the eleven original Palladian villas, Wittkower's A-B-A-B-A grid informs Rowe's analysis of Le Corbusier's villa Stein, and is then developed volumetrically in Eisenman's analysis of Terragni's Casa del Fascio. In Hershey's and Freeman's software, Wittkower's grid becomes a generator of other possible Palladian villas. Illustration Concept: Stylianos Giamarelos, based on the original drawings and diagrams by Rudolf Wittkower, Colin Rowe, Peter Eisenman, and George L. Hershey & Richard Freeman. Visualisation: Johanna Just.

positivist outlook. This is why an attempt to return to Rowe's formalism as if the wider postmodern critique never took place can only prove futile.

Recent attempts to recuperate Palladio for the digital age (by Peter Eisenman and Matt Roman, and Kyle Miller) also miss this crucial point.³⁷ In their outlook to the past and their critique of Wittkower's idealist geometries of the grid, Eisenman and Roman are equally one-sided. Although they replace Wittkower's flattened grids with the non-Euclidean topological concepts of location and adjacency to examine Palladio's villas volumetrically, they do not also take the generative step forward. They just reproduce Eisenman's well-known Saussurian conclusions on architectural language as a system of differences that is not based on Wittkower's pre-established normative unity of harmonic proportions. Once again, as in the case of Wittkower and Rowe, Eisenman's conclusions say more about his well-known interpretive lens from the 1980s onwards than about Palladio's own original intentions. And when Kyle Miller similarly follows Lynn's observations to generate 'The Thirteenth Villa', a discussion of the possible historical/analytical relevance of formalism today is hardly addressed, let alone advanced.

The enduring debates around a possible synthesis of formalism with contextualist concerns, however, shed another light on Petit's attempt to update Rowe. The major question remains: is an updated version of Rowe's analytical method adequate for the current predicament of the architectural profession? Rather alarmingly for the contextualists, their main socio-political concerns are not only absent from Petit's attempt to update Rowe's formalism. They also persist in their absence from his recent book on postmodern architecture. In the final instance, his proposed 'retheorisation' of the postmodern years defends the problematic conception of the architect as an individual author.

For Petit, architecture is a humanist epistemology loaded with the existential self-critical concerns of its auteurs. In his account of postmodern architectural practices, the architect thus re-emerges as a strong poet that develops a 'hyper-intellectual self-awareness'. In Petit's eyes, this novel figure of the postmodern architect can help reclaim individual agency in an era proliferated by the posthuman ramifications of digital technologies of design and fabrication.³⁸ In his book, Petit explicitly opposes the approaches and methods adopted by the contextualist 'Marxist authors' of the postmodern years, including Manfredo Tafuri, Kenneth Frampton, and Mary McLeod.³⁹ Taken to its furthest reaches, his work thus seems to signal a purge of socio-political concerns not only from the practice, but also from the theoretical discourse around architecture. In both this defence of humanism and the rejection of contextualist concerns, Petit's approach is therefore found to be lacking even from the standpoint of the current digital practitioners' stated concerns.

Petit's architectural discussion thus seems to be heading towards socio-political apathy. However, Rowe's work crucially 'reminds us that architecture exists only in relation with a theory of architecture'.⁴⁰ It is theory that can address these architectural concerns first. Recalling Rowe at the present moment can therefore prove fruitful. Seriously reckoning with him in the current epistemological landscape, however, entails more than what is offered by Petit. Inserting novel abstract analytical categories and updating Rowe's list of formal antecedents and precedents accordingly is not enough. What Rowe regarded as architectural theory also needs to be enriched for the present. In this, the enduring elements of the intervening postmodern critical intelligence cannot be ignored. Rowe's formalism can only be retained in the present by engaging with the legacy of these parallel theoretical developments that also originated in his time. These went far beyond an understanding of architecture

as a mere play of forms, however masterful and magnificent this might look when brought into the light.

In its many different guises, the postmodern debate that flourished in the 1980s posited itself as a wide-ranging epistemological challenge. In its light, if formalism is to survive as a significant method of analysis for the immediate present, it needs to be radically rethought. A contemporary method of formal analysis needs to address the complex exigencies of this postmodern epistemological landscape. Such a method of analysis would attempt to situate Petit's discussions of form not only within the context of historical precedents. It would also place it within the epistemological, ethical, social, economic, and political contexts of the modes of production of these novel forms and their accompanying technologies.⁴¹ At first glance, this seems like an approach that cannot easily be reconciled with Rowe's formalism of the grid. However, resorting to the historical approaches that Petit explicitly rejected might prove more fruitful than he thought. To cite just one example, in his recent *Genealogy of Modern Architecture*, Frampton revealed how he utilised the philosophy of Hannah Arendt and Maurice Merleau-Ponty as a generator of categories for analysing built form. After approximately forty years of developing this comparative analytical method with his graduate students at Columbia University, Frampton's readings of modern architecture point towards an integrated approach to formalism. This can also serve as an alternative response to the similar synthetic demands of digital practitioners today.⁴²

This general direction seems to be the way forward for any contemporary variant of formalism that intends to address the poststructuralist critiques of the intervening decades. Caroline Levine's recent work on formalism in literary studies is another significant case in point here. It is another attempt to

bring together what has so far been kept 'analytically separate', i.e. formalist analysis with socio-political and historical research. Levine understands form as an ordering device that inherently organises power relations. Borrowing the concept of affordance from design theory, Levine thus sets out to expand the 'usual definition of form ... to include patterns of sociopolitical experience'.⁴³ Intersectional analyses like these seem to constitute the bridge over which any formalism of the future needs to pass if it is to remain relevant in the current architectural predicament. However difficult the task at hand may be, the legacy of precedents like Rowe's, Petit's, and Frampton's can only encourage current architectural historians and theorists to push their intersectional analyses of these projects further forward.

Such studies have just started appearing in the field of digital architectural practices. Tal Bar recently engaged with poststructuralist philosophy to challenge the dominant narratives of novelty in the founding discourses of digital design practices. Whether these discourses focus on questions of form and style (as in the 1990s), or on the technical side of computation, mathematics and algorithms (from the mid-2000s onwards), Bar argues that the architectural production of current digital design practices is not post-humanist.⁴⁴ Contrary to the inflated claims of the theoretical evangelists, digital practitioners still work within a decisively humanist framework.⁴⁵ Although they allude to post-humanist epistemologies and methodologies, their software, as well as the mathematics and geometries that underpin it (including topology), still rest on modern, humanist and disembodied ontologies.⁴⁶ This misalignment of epistemology with ontology means that the celebrated post-humanist thinking of digital design practices is only superficial. Practitioners, historians and theorists of the digital age, whether they currently work in the geometric/algorithmic or biomimetic paradigm, are therefore unable to produce the qualitative difference they evangelise.

Contrary to their claims, their digital design practices remain universalist, exclusive, and insensitive to otherness.

It is these debates that a contemporary variant of formalism would need to address. The examples just cited exemplify a way forward. They could therefore serve as useful precedents towards an integrated formalism for the present, or a more significant after-life for Rowe's work in the digital age.

Notes

This article started life in Peg Rawes's 'Situating Architecture', and Robin Wilson's 'Practices of Criticism' MA in Architectural History seminars at the Bartlett School of Architecture in 2014 and 2017. I thank them both for inviting me to present my work, and giving me the opportunity to further develop my initial thoughts on Rowe's formalism in the digital age. I am also grateful to Emmanuel Petit for granting permission to reproduce his diagram and Johanna Just for her work on the illustration.

1. See Emmanuel Petit, 'Spherical Penetrability: Literal and Phenomenal', *Log* 31 (Spring/Summer 2014): 31–39; Colin Rowe and Robert Slutzky, 'Transparency: Literal and Phenomenal', *Perspecta* 8 (1963): 45–54.
2. Patrik Schumacher, *The Autopoiesis of Architecture, vol. 1: A New Framework for Architecture* (Chichester: Wiley, 2011), 214–215.
3. Rudolf Wittkower, *Architectural Principles in the Age of Humanism* (London: The Warburg Institute, University of London, 1949), 70–73.
4. Colin Rowe, *The Mathematics of the Ideal Villa, and Other Essays* (Cambridge, MA: MIT Press, 1976), 8.
5. Rowe, *Mathematics of the Ideal Villa*, 15.
6. However, a similar analysis was not carried out in detail for the other examples suggested by Rowe. His proposed comparative reading of Schinkel's Berlin Altes Museum and Le Corbusier's Palace of the Assembly at Chandigarh remained sketchy.
7. Petit, 'Spherical Penetrability', 35.
8. Colin Rowe and Fred Koetter, *Collage City* (Cambridge, MA: MIT Press, 1979).
9. Zaha Hadid and Patrik Schumacher, 'Parametricist Manifesto', in *Out There: Architecture Beyond Building, vol. 5, Manifestos, 11th International Architecture Exhibition La Biennale di Venezia* (Venice: Marsilio, 2008), 60–63.
10. Rosalind E. Krauss, 'Grids', in *The Originality of the Avant-Garde and Other Modernist Myths* (Cambridge, MA: MIT Press, 1985), 13.
11. To cite just one example, see Kostas Terzidis, *Algorithmic Architecture* (London: Routledge, 2006), 55.
12. Rowe, *Mathematics of the Ideal Villa*, 16.
13. Alina A. Payne, 'Rudolf Wittkower and Architectural Principles in the Age of Modernism', *Journal of the Society of Architectural Historians* 53, no. 3 (September 1994): 322–342; 340–341.
14. Krauss, 'Grids', 10.
15. *Ibid.*, 22; 10.
16. Peter Eisenman, *The Formal Basis of Modern Architecture* (Baden: Lars Müller Publishers, 2006), 21.
17. Eisenman, *Formal Basis*, 17.
18. *Ibid.*, 21.
19. *Ibid.*, 63. Eisenman's discussion of the grid ranges from pages 63–71.
20. *Ibid.*, 292–315 for Eisenman's analysis of Terragni's Casa del Fascio.
21. For a recent reading of Eisenman's House Series in relation to the work of Colin Rowe, see Stefano Corbo, *From Formalism to Weak Form: The Architecture and Philosophy of Peter Eisenman* (Surrey: Ashgate, 2014), 27–34.
22. Peter Eisenman, 'Post-Functionalism', *Oppositions* 6 (Fall 1976).
23. Not convinced by Eisenman's 'schismatic post-modernism', Robert Stern was one of the first North American critics to express his concerns with this approach. See Robert Stern, 'The Doubles of Post-Modern', in *Robert Stern*, ed. Robert Stern and Vincent Scully (London: Academy Editions, 1981), 63–68.
24. For a concise consideration of this turn in Eisenman's work, see Thomas Patin, 'From Deep Structure

- to an Architecture in Suspense: Peter Eisenman, Structuralism, and Deconstruction', *Journal of Architectural Education* 47, no. 2 (1993): 88–100.
25. Schumacher, *Autopoiesis of Architecture*, vol. 1, 268.
26. *Ibid.*, 191.
27. Sandra Kaji-O'Grady, 'Formalism and Forms of Practice', in *The SAGE Handbook of Architectural Theory*, ed. C. Greig Crysler, Stephen Cairns, and Hilde Heynen (London: Sage, 2012), 152–164; 152–153.
28. Sean Blair Keller, 'Systems Aesthetics: Architectural Theory at the University of Cambridge, 1960–75'. (Unpublished PhD thesis, Harvard University, 2005).
29. Colin Rowe, 'Introduction', in *Five Architects: Eisenman, Graves, Gwathmey, Hejduk, Meier*, ed. Peter Eisenman et al. (New York: Wittenborn, 1972).
30. Rowe and Koetter, *Collage City*.
31. Cf. Robin Evans, *The Projective Cast: Architecture and its Three Geometries* (Cambridge, MA: MIT Press, 1995), 73–75.
32. Greg Lynn, 'New Variations on the Rowe Complex', in *Folds, Bodies & Blobs: Collected Essays* (Brussels: La Lettre Volée, 1998), 199–221; 201–202.
33. *Ibid.*, 208.
34. George L. Hershey, and Richard Freeman, *Possible Palladian Villas, Plus a Few Instructively Impossible Ones* (Cambridge, MA: MIT Press, 1992).
35. Stan Allen, 'From Object to Field', in *The Digital Turn in Architecture, 1992–2012*, ed. Mario Carpo (Chichester: Wiley, 2013), 63–79; 71.
36. Braden R. Engel, 'Ambichronous Historiography: Colin Rowe and the Teaching of Architectural History', *Journal of Art Historiography* 14 (June 2016): 1–22.
37. Peter Eisenman and Matt Roman, *Palladio Virtuel* (New Haven: Yale University Press, 2016) and Kyle Miller, 'The Thirteenth Villa', *Journal of Architectural Education* 70, no. 1 (2016): 91–95.
38. Emmanuel Petit, *Irony; Or, the Self-Critical Opacity of Postmodern Architecture* (New Haven: Yale University Press, 2013), 24–25 and 214–215.
39. Petit, *Irony*, 18–21.
40. Bernhard Hoesli, 'Commentary', in *Transparency*, ed. Colin Rowe and Robert Slutzky (Basel: Birkhäuser Verlag, 1997), 59; cited by Emmanuel Petit, 'Rowe after Colin Rowe', in *Reckoning with Colin Rowe: Ten Architects Take Position*, ed. Emmanuel Petit (New York: Routledge, 2015), 20.
41. See, for instance, Matthew Poole and Manuel Shvartzberg (eds.), *The Politics of Parametricism: Digital Technologies in Architecture* (London: Bloomsbury Academic, 2015), and Douglas Spencer, *The Architecture of Neoliberalism: How Contemporary Architecture Became an Instrument of Control and Compliance* (London: Bloomsbury Academic, 2016).
42. Kenneth Frampton, *A Genealogy of Modern Architecture: Comparative Critical Analysis of Built Form* (Zurich: Lars Müller Publishers, 2015).
43. Caroline Levine, *Forms: Whole, Rhythm, Hierarchy, Network* (Princeton: Princeton University Press, 2015), 1–2; 6.
44. Tal Bar, 'Digital Architecture and Difference: A Theory of Ethical Transpositions towards Non-representational Embodiments in Digital Architecture.' (Unpublished PhD thesis, University College London, 2017).
45. See, for instance, Antoine Picon, *Digital Culture in Architecture: An Introduction for the Design Professions* (Basel: Birkhäuser, 2010), and Terzidis, *Algorithmic Architecture*.
46. Bar proposes Rosi Braidotti's nomadic thinking as an alternative model to these ontologies. See Rosi Braidotti, *Nomadic Subject: Embodiment and Sexual Difference in Contemporary Feminist Theory* (New York: Columbia University Press, 2011).

Biography

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Review Article

Autonomy by Drawing: Gianugo Polesello on Route 66

Giovanni Corbellini

The 50th anniversary of Robert Venturi's *Complexity and Contradiction in Architecture* was celebrated recently. It was not just a ritual occasion, since Venturi's is one of the most influential books of the twentieth century and the debate it partly triggered still haunts contemporary reflections.¹ His manifesto, though 'gentle' and inclusive, owes part of its enduring success to a harsh polemic with the ideology established by the protagonists of the Modern Movement: a personal 'symbolic suppression of the parents' that mirrors the need for identity affirmation of an entire generation educated in the aftermath of World War II.

A decisive shift towards the interiority of the discipline, shared by Venturi and his peers on both sides of the Atlantic, characterised that moment. If the Modern Movement founded the necessity of its 'style' as a deterministic outcome of contemporary social and productive pressures, Venturi focuses conversely on the *autonomy* of architecture as a means of regaining that centrality that the same contemporary conditions actually threatened.² The meaning of spaces and buildings, set free from the practical reasons for their existence, becomes a matter of *composition*, taking architecture onto a field where architects can express their *intentions* and still play their own role. This latter would essentially rely on reading and modifying relationships, in time and space, with the *typo-morphological contexts*. The playground of architecture, thus essentially redefined in terms of *form* and *language*, turns into a synchronic whole that allows it to freely

compare new and ancient, high and low, daily and monumental, revealing its combinatorial games. From the point of view of this 'grammar', rear- and avant-garde tend to lose reciprocity of meaning and, consequently, *tradition* transfigures into a progressive horizon; *originality*, so necessary for modernist identity, negotiates with *origins* and their interpretations; while *theory* assumes a new – and, again, autonomous – role with respect to the predominantly propagandistic function that it previously performed.

Not all the key terms of this rapid list are properly Venturian. Some of them, though they recognise common issues, refer to a different local situation. In 1966, the year of *Complexity and Contradictions in Architecture*, two important books came out in Italy. Compared to the American pamphlet, both *L'architettura della città*, by Aldo Rossi,³ and *Il territorio dell'architettura*, by Vittorio Gregotti,⁴ propose a more ambiguous relation with the modern. On the one hand, they probably did not feel this polemic urgency. As collaborators of Ernesto Nathan Rogers at the illustrious architecture journal *Casabella continuità*, Gregotti and Rossi were part of a current of thought that had already anticipated a gaze not perfectly aligned with modernist orthodoxy: the identification in some symbolic architectures of Fascism between modern language and modernisation, albeit timid and intermittent, had a role in provoking various pieces of research in the immediate post-war period. On the other hand, Italy underwent less harsh architectural Freudian conflicts, partly thanks

to the disenchanting reception of the historic avant-gardes in that country. Like the Americans, Italians primarily understood and manipulated the aesthetic dimension of these avant-gardes, but tempered by cultural peculiarities and systemic backwardness that made their languages less plausible as representational tools for a still underdeveloped society.⁵ The Mediterranean, Roman-classical interpretation imposed by Fascist rhetoric comes out in the Beaux-Arts version of Giuseppe Terragni's *Novocum*, 1928, and in Giuseppe Vaccaro's *Palazzo delle Poste* in Naples, 1933. These were smart gimmicks aimed at introducing a modern language in a hostile context; they also show how architectural languages can be interpreted as interchangeable decorative devices: an approach that re-emerges with 'La Tendenza' from the moment of its neo-rationalist debuts.⁶ These differences of context explain only to some extent, however, a more substantial division: while Robert Venturi's manifesto develops a phenomenological, inclusive, liberating, pluralist, and pop attitude, nurtured by a sincere curiosity about the contemporary, both the Italians, faithful to Leon Battista Alberti's ideal of abstraction and vertical control, propose more elitist, politicised, paternalistic and dogmatic approaches.

Gianugo Polesello, a fellow member, with Aldo Rossi, of *Casabella's* 'think tank' of young architects and his partner in some projects, undertook a similar theoretical operation, conducted, however, through a more explicit and precise medium, to the limits of tautology: architectural design or, more precisely, architectural drawing applied to design. What can one find, in the toolbox of the architect, which is more *autonomous*, *internal* to the *discipline*, linked to *form*, demonstrating *compositional* operations, capable of experimenting and fixing terms and correlations of *language*? The project that made Polesello into the theoretical architect he wanted to be is the proposal for the offices of the House of Representatives in Rome, in 1966. [Fig. 1] In this important year, his characteristic

compositional vocabulary appears fully formed. It is a vocabulary made of primary forms (equilateral triangles, squares, circles), of geometries associated with them (the orthogonal grid contrasted with the median and diagonal lines of the figures used), of absolute archetypes (columns, arcades, galleries, walls...), of classic urban elements (forums, markets...), of recurring numbers (3, 4 or 9 towers; 16 or 25 columns, multiples of 1.5 or 1.75 metres). With this set of self-limited pieces and rules, Polesello would go on to play a single, uninterrupted game along the different projects he produced throughout his long career.⁷

Significantly, the *Electa* monograph that collects his work until 1992 removes the usual chronological organisation, proposing instead a thematic arrangement inspired by the architecture-city relationship.⁸ It seems clear that Polesello's intention was to escape the action of time on his own design approach, and to attain a legible, consistent, and steady personal style. This quest was a main concern for many protagonists of his generation and the real subject of the tough competition they engaged in: a rivalry that would otherwise be incomprehensible, since their theoretical positions were not so distant.⁹ Within the faculty of the Venetian doctoral programme where I crossed paths with Gianugo, in the late 1980s, several exponents of Rogers's progeny were present: my mentor Francesco Tentori, Polesello himself, Luciano Semerani, Guido Canella, Giorgio Grassi, and Aldo Rossi (but the future Pritzker Prize winner was playing in another league and his attendance was rare). There were, of course, differences of character and contrasts due to academic politics, but they shared, along with that of the *Casabella* think tank, other common experiences and interests: a leftist commitment, a deep attention to history and its archetypes, an inclination toward the urban dimension rather than to the detail, and a decisive rejection of the frivolousness of fashion. Such tenacious attention to their own 'sartorial' brand, in terms of architectural language, was

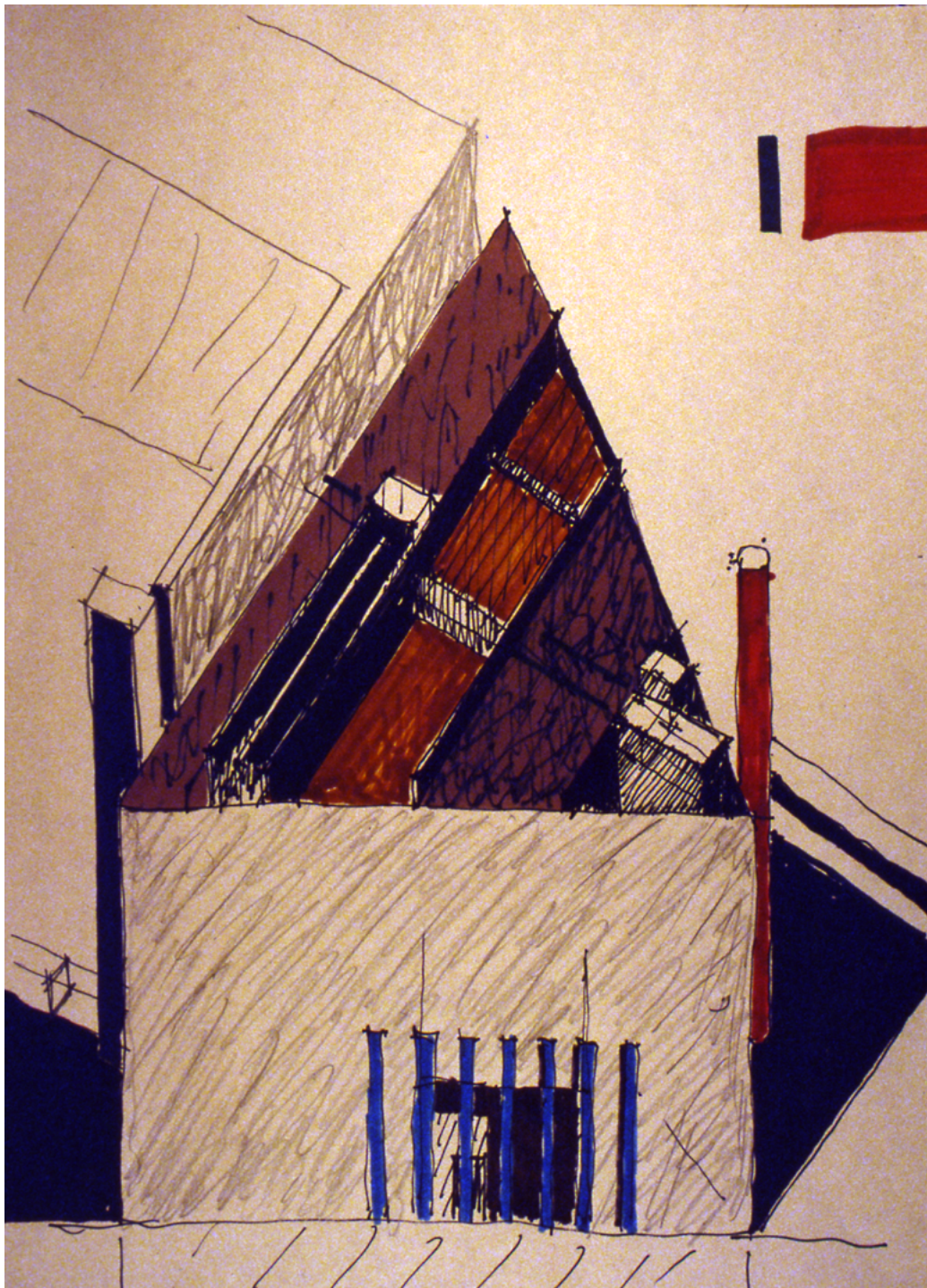


Fig. 1: Offices of the House of Representatives, Rome, 1966, axonometric sketch, courtesy of Università luav di Venezia, Archivio Progetti, fondo Gianugo Polesello.

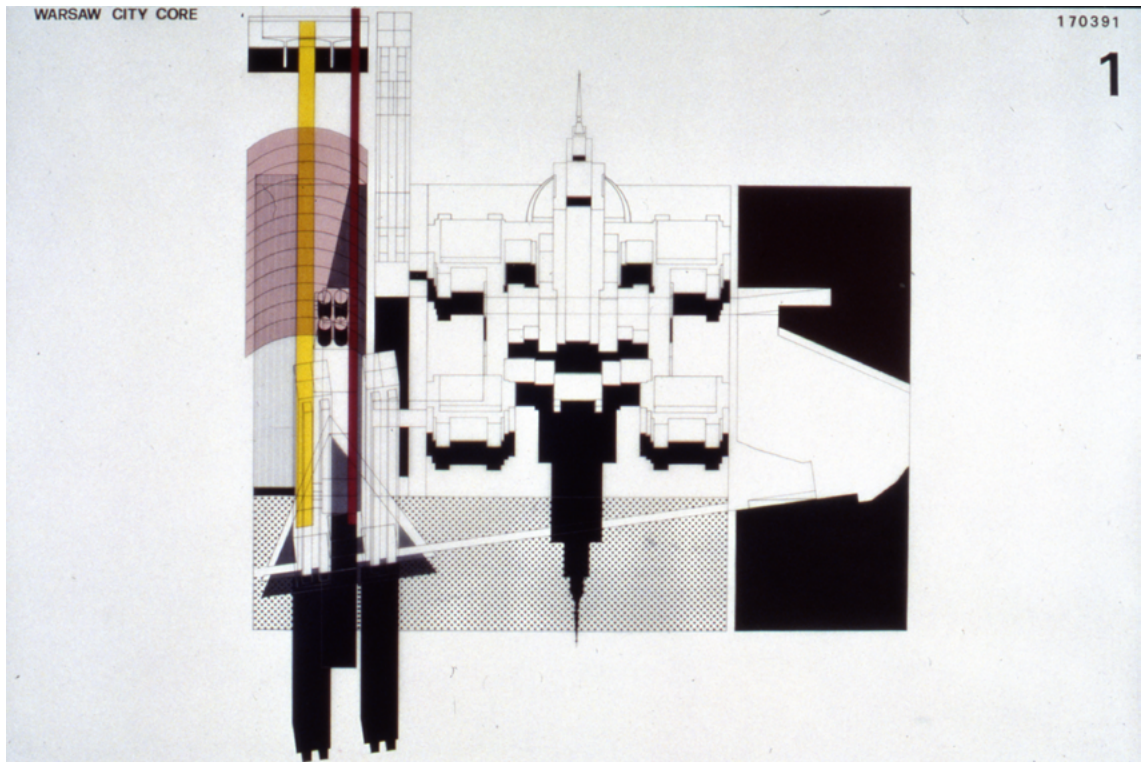


Fig. 2: Competition for Warsaw City Core, 1992, axonometric drawing, courtesy of Università Iuav di Venezia, Archivio Progetti, fondo Gianugo Polesello.

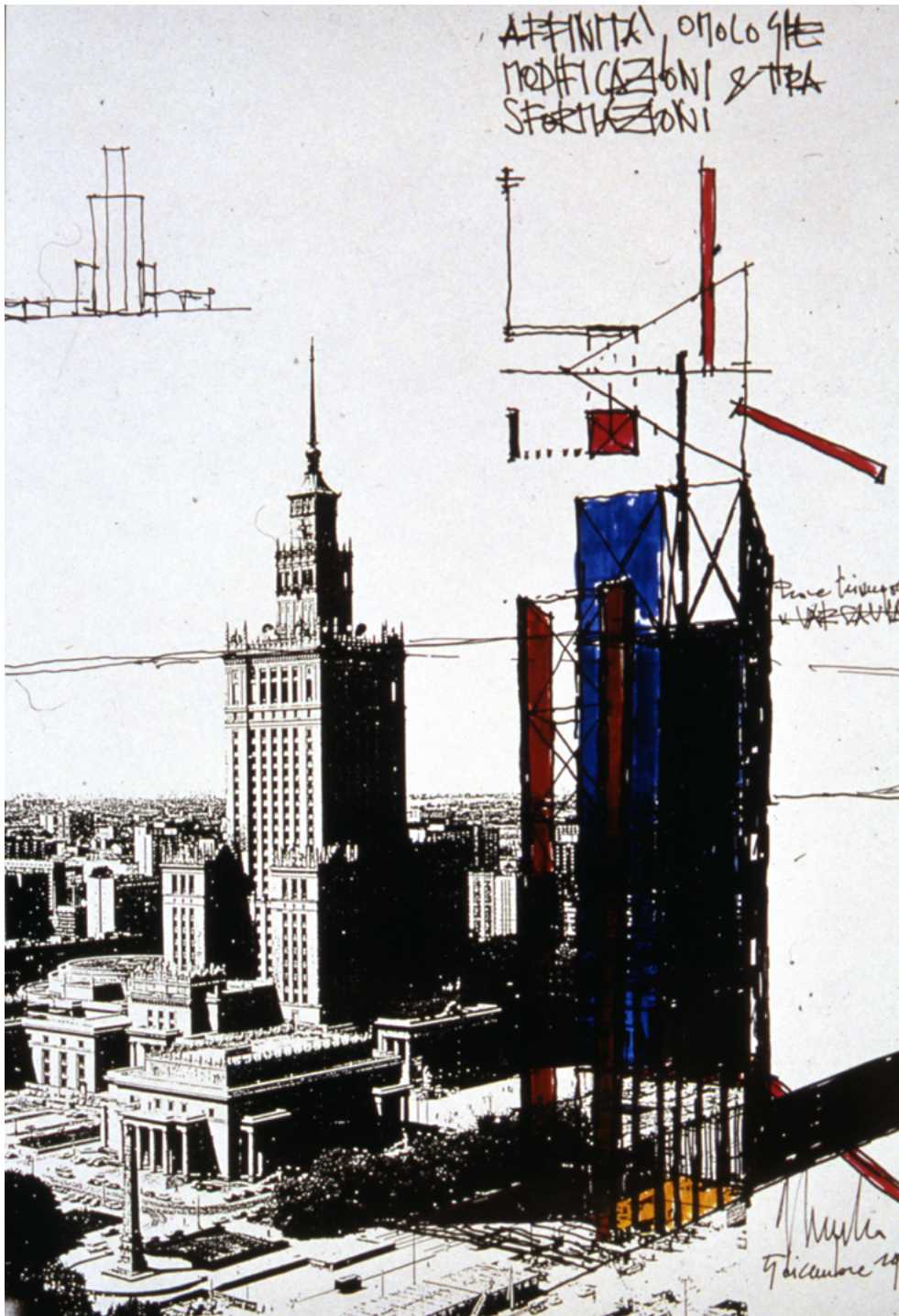


Fig. 3: Competition for Warsaw City Core, 1992, photomontage with the towers, courtesy of Università luav di Venezia, Archivio Progetti, fondo Gianugo Polesello.

therefore rather surprising.¹⁰ Especially because their declared theoretical intention was to delimit 'scientifically' the disciplinary action and to propose potentially exhaustive design methods. Of course, each of them pretended to believe in his own individual attitude as the one and only true architectural response. Their attempts to resist the spirit of time through the quest for the ultimate architectural language was a paradoxical expression of the spirit of time, and made the most successful of them ready to join in the 1990s the rising, fashionable phenomenon of the 'starchitects'.

Another aspect of this difficult relationship between theory and practice, stoked up by the aspiration to the 'autonomy of architecture', is the scant interest in negotiating the many facets of reality that Polesello shared with his peers. In his monograph, the rare built architecture projects tend to remain in the background, illustrated with small black and white photos, as if their realisation was incidental, a by-product of the project process and not its main reason. There are also few details and references to material, tactile or perceptual qualities, while the overall designs prevail, illustrated by 'large plans' and fantastic purist axonometric drawings, in which the coincidence of the vertical axis with that of the depth produces an acceleration towards the abstraction of the surface. [Fig. 2-3] Many of the architects who joined the faculty of the aforementioned Venetian doctoral programme cultivated an analogous radical indifference towards construction, as if to establish their own intellectual – and above all political – identity it was necessary to withstand the numerous building opportunities offered them by the Italian economic miracle. It was a radical, abstract approach, both triggered by and producing an idea of architecture conceived as a discipline rather than a profession, further influenced by the early co-optation of some of them within the school and the evolution of the latter towards a mass university.

The impact of the baby boomers on the Italian architecture schools in the 1970s and '80s was huge, and academic design studios were stuffed with several hundreds of students. The transmissibility of architectural-compositional knowledge became therefore one of the most discussed topics. Polesello's Durandian apparatus – his combinatorial mechanics of fixed elements – was a design method unfolded within a teaching perspective: a guarantee against the margins of interpretation that even the most rigorous textual theory leaves open, which allowed for the focus of the design exercises on the linguistic core specifically identified as the main experimentation ground, and to get identifiable and assessable results. The need to cope with increasing numbers of students – and assistants, to whom were necessarily delegated fundamental parts of the educational process – made this device even more appealing.

In the plurality of experiences of a five-year course of study, this teaching method may even sound plausible: exposed to different linguistic 'sects', the student had to develop his or her own synthesis. Some perverse side effects were, however, inevitable, especially on the formation of collaborators and future teachers. Initially selected for our mimicking attitudes, our masters tried to 'design' us as doppelgängers, resulting in some cases in a grotesque cloning of behaviours and tics: even the way of sketching. It is as if these architects and professors could not help but look in the mirror and find in these 'reflections' the fundamental elements of their theoretical and didactic action. The many self-portraits Gianugo drew in his black notebooks stand out as particularly significant in this regard.¹¹ His recurring countenance, often mingled with the geometries of his design grammar, also reflects the sharp self-referentiality of his method, the rigidity of his self-discipline, and the undoubted charisma that derived from it. [Fig. 4-5]

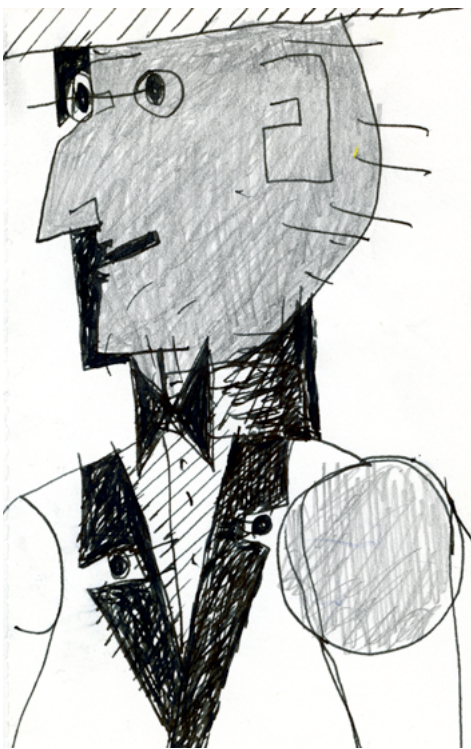


Fig. 4

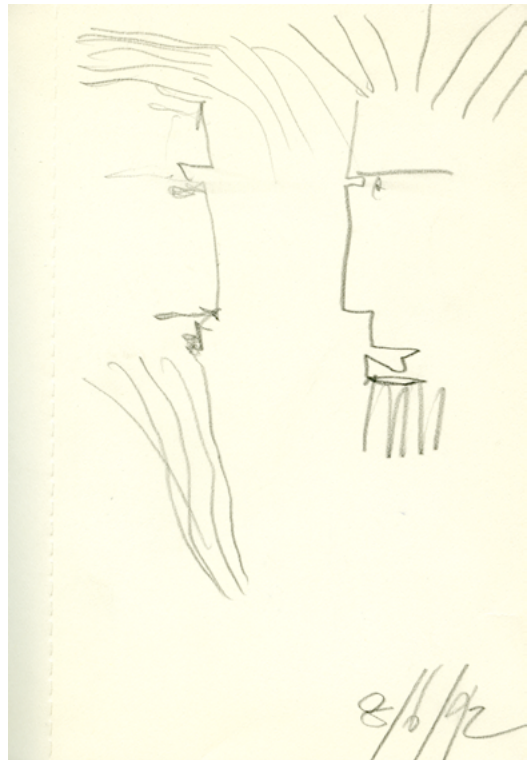


Fig. 5

Fig. 4: Self-portrait with bow tie, Notebook 35 (4 April 1990), courtesy of Università luav di Venezia, Archivio Progetti, fondo Gianugo Polesello.

Fig. 5: Double self-portrait, Notebook 52 (8 June 1992), courtesy of Università luav di Venezia, Archivio Progetti, fondo Gianugo Polesello.

What kind of teacher was Polesello? I recently came across a description of teaching, valid especially for art disciplines, which identifies two opposite modes, both mutually effective and incomplete. On the one hand, there are teachers who try to explain the structure of things, with the ambition to give meaning to an open process but knowing that there is often a gap between words and forms. On the other hand, there are those who teach through examples to imitate, educating students with rewards and punishments, and waiting for them to come up with their own understanding of their reasons. My experience with Gianugo was limited to the particular environment of a PhD; something mainly based on discursive exchanges and therefore not very meaningful in relation to his 'research by design' approach. The superficial impression he gave was of a logical attitude of the first type: he criticised our clumsy presentations with Cartesian eloquence, tracing clear-cut geometries in the linearity of the discourse, as if engraved in metal (his angular way of talking, often with inverted verbal constructions, somewhat resembled that of Master Yoda in Star Wars). But he talked mainly about and to himself, bringing the words and arguments of the debate into his specific cultural obsessions, thus revealing a more sincere penchant for a teaching approach of the second type. Again, this was a system shared with most of his colleagues determined to affirm a specific academic identity, confined to its genealogy and carefully protected from external contamination.¹²

His texts, read now, produce the same mirroring effect. They do not explain: they describe procedures that are finite in themselves and almost never connected with reasons outside geometry. It is still hard to grasp from them a critical distance capable of activating operational links between words and design. However, this might be my fault: for I long ago 'symbolically killed' my parents too, though, I hope it is clear, it was in self-defense. Does it make sense, then, apart from the formal celebrations, to

return to these events today? Is it again time for the ideologies of the sixties? Get your kicks on Route 66?¹³

It would seem so, at least when looking at what is going on in the debate about architectural theory. The economic, ecological, and social crisis we are dealing with has generated, in the academic discussion and in the reflection of the arts, an overwhelming re-emergence of political engagement, felt as a necessary alternative to the neo-liberal *pensée unique* and a way to avoid the damage it produces. The 'return to order' this movement is calling for aims to (re)produce, after postmodern relativism, a more stable and shared picture.¹⁴ The 2014 Biennale, directed by Rem Koolhaas, contributed to record this phenomenon: by assigning the theme of 'Absorbing Modernity' to the national pavilions, it obtained a response that focused on the 1960s as a period of convergence between progressive, political, technical, and aesthetic instances. In the same Venetian exhibition, the 'Monditalia' section hosted Beatriz Colomina's work with the Princeton PhD programme on 'Radical Pedagogies', focused there on the intricate Italian educational landscape of the same years, agitated by the intersections with various movements of social liberation active at the time. Despite its accuracy, the material displayed in Venice – due to the temporal, geographical and cultural distance of observation – conveyed a flattened picture of otherwise conflicting ideas and approaches. It is an impression that often arises at other discussions around these issues, mainly occurring in an international, mostly Anglo-Saxon, context and fuelled by a deferred reception of continental discussions (post-structuralist jargon and quotations seem mandatory). This prevalence of the political could also be a side effect of the ongoing separation in academia between the teaching of theories and that of design, where some compromise with capital is inevitable. Even within the protected environment of academic speculation, the attempt to resuscitate

from the sixties these architectural approaches should however consider the evident changes in historical context: the presence of a Communist bloc, for instance, was a stimulus to 'socialise' the policies of the first world, making them conceptually viable to be somehow both within and against the system.¹⁵ This attempt should also deal with some problematic consequences the attitude it is so interested in produced, as the Italian built landscape loudly reminds us. The questionable objects that populate its horizon – whether they are directly attributable to the protagonists of 'La Tendenza' and their many followers or not – are by-products of a defensive 'retrotopia', of the sick reproduction of languages within the typo-morphological paradigm that imprints Italian master plans and local codes.

A more secular, post-ideological attitude could perhaps get rid of this nostalgia of a nostalgia, longing for a mythical consistency of the political and the formal. It might discover in that research a preponderant poetic dimension, ultimately liberated from the theoretical attempts to deny it. This is what emerges as fresh content from the drawings of Gianugo Polesello today and asks for an operative re-interpretation.

Notes

This article questions the revival of the 'Tendenza' in the recent architectural debate, taking the work of Gianugo Polesello as a privileged vantage point. The Italian architect – along with Aldo Rossi, Giorgio Grassi, Guido Canella and other protagonists of that approach – taught in the Venetian PhD attended by the author, who recalls here his first-hand experience.

1. Robert Venturi, *Complexity and Contradiction in Architecture* (New York: Museum of Modern Art, 1966). Michel Kubo, 'Publishing Practices', *Volume*, 22 (2009): 20–26, asked approximately three hundred readers to indicate their fundamental architecture books; Venturi's essay was the third most voted for.
2. The word style derives from the Latin *stilus*. It is a notion strictly tied to the tools used and, therefore, to the wide context in which a work is produced. At the same time, it identifies stable aesthetical paradigms. Neither of these meanings are central for Venturi, who rather addresses the possibility to recognise systems of relationship between the whole and the parts, independently from their condition of production.
3. Aldo Rossi, *The Architecture of the City*, trans. Diane Ghirardo and Joan Ockman (Cambridge, Mass.: MIT Press, 1982 [1966]).
4. Vittorio Gregotti, *Il territorio dell'architettura* (Milan: Feltrinelli, 1966). It was translated in French, but not in English.
5. The exhibition 'International Style', curated at the MoMA by Henry Russel Hitchcock and Philip Johnson in 1932, treated European modernism as a 'classic' style, isolating it from the socio-political context from which it emerged: 'we were ignorant of the political dimension of the art; for us it was revolutionary, but only aesthetically. Our Job', Johnson remembers, 'was to advocate, to sell these new cultural innovations to the wealthy and powerful. ... I must say that, if naive, our enthusiasm for the avant-garde was nevertheless real; we loved it; we never thought of ourselves as servants of the market system, the very system the work opposed. Though, of course, we were.' Philip Johnson, Jeffrey Kipnis, 'A Conversation Around the Avant-Garde', in *Autonomy and Ideology. Positioning an Avant-Garde in America*, ed. Robert Somol (New York: Monacelli Press, 1997), 42.
6. 'La Tendenza' is an Italian movement that conventionally spans from the publication of Aldo Rossi's *The Architecture of the City* (1966) to Paolo Portoghesi's Strada Novissima at the 1980 Venice Biennale. It developed the antimodernist, vernacular attitude of postwar Italian architecture towards a focus on urban issues and an operative relationship with history, claiming inspiration from the Enlightenment. Its high point was the architectural section of the 1973 Milan Triennale, which gathered around Rossi other protagonists of the movement: see *Architettura razionale*, ed. Ezio Bonfanti, Rosaldo Bonicalzi, Aldo Rossi,

- Massimo Scolari, Daniele Vitale (Milan: Franco Angeli, 1973). 'La Tendenza' has been recently analysed by an exhibition at the Pompidou centre (20 June–10 September 2012): see the catalogue *La Tendenza: Architetture italiane 1965–1985*, ed. Frédéric Migayrou (Paris: Centre Pompidou, 2012).
7. 'The project for the new offices of the House of Representatives in Rome ... aimed at a formal absoluteness already evident in its plan, with the proposal of the first basic shape in geometry. It certainly belongs to a language approach, to the necessity of a style, of an identity.' Gianugo Polesello, 'La classificazione del progetto', in *Gianugo Polesello: Architetture 1960–1992*, ed. Mirko Zardini (Milan: Electa, 1992), 14 (author's translation).
 8. Ibid.
 9. Francesco Tentori, 'Nell'epoca dei linguaggi personali,' in *Materiali per il corso di progettazione urbana* (Venice: luav-Dpa, 1989), frames the long post-war period of Italian architecture as an 'eclecticism of random choices' (p. 114). It is the text of a lecture, significantly entitled 'In the Epoch of Personal Languages', where he harshly attacked both Gregotti and Rossi.
 10. Polesello was a member of the Italian Parliament for the Communist Party, 1983–87.
 11. See *Gianugo Polesello: Dai quaderni*, ed. Gundula Rakowitz (Padua: Il poligrafo, 2015).
 12. Francesco Tentori, first coordinator of the Venetian PhD programme in architectural composition, organised as its initial activity a cycle of lectures about the masters who were important for his generation. See *Lezioni di progettazione: 10 maestri dell'architettura italiana*, ed. Marina Montuori (Milan: Electa, 1988).
 13. Bobby Troup's song was a Cole Porter hit in 1946, but the Rolling Stones' version, released in 1964, would work better as a (contradictory) soundtrack for my text.
 14. Pippo Ciorra – who attended that Venetian PhD programme – addresses various paradoxes of this backlash of the 1960s: '(Un)political', in *This Thing Called Theory*, ed. Teresa Stoppani, Giorgio Ponzio, and George Themistokleous (London: Routledge, 2016).
 15. See Bernard Cache, 'Obama versus Irresponsibility: Can Moderation Triumph over Greed', in *Projectiles* (London: AA Publications, 2011). The fall of the Berlin Wall was a major event especially for my masters' generation. Massimo Scolari, interviewed by Léa-Catherine Szacka and Thomas Weaver, *AA Files*, 65 (2012): 43, remembers 'Gianugo Polesello behaving as if his world had just collapsed. For a lot of the Venetian designers and scholars, this ideology formed a kind of shield or umbrella under which a dogma of sorts started to develop which didn't allow for any kind of experimentation or discussion.'

Biography

Giovanni Corbellini, architect with a PhD in architectural design, and a critic of contemporary architecture, has taught in Venice, Ferrara and Milan. He is currently assistant professor at the University of Trieste. The author of many essays, his latest books are: *Ex libris: 16 parole chiave dell'architettura contemporanea* (22 publishing, 2007, republished by LetteraVentidue, 2015), *Bioreboot: The architecture of R&Sie^(m)* (Princeton Architectural Press, 2009), *Dr. Corbellini's Pills* (LetteraVentidue, 2010, translated into French, 2012, and English, 2016), *Housing is Back in Town* (LetteraVentidue, 2012), *Parametrico nostrano* (with Cecilia Morassi, LetteraVentidue, 2013), *Go Re-cycle!* (e-book edited with Eva De Sabbata, LetteraVentidue, 2014), *Lo spazio dicibile. Architettura e narrativa* (LetteraVentidue, 2016; English edition forthcoming).

Review Article

Surform: An Architectural Vocabulary of Morphogenesis

J.M. Rees

Inner and outer seem sharply divided. How does thinking change if they are continuous? (Brown, 2011)¹

I shall begin with a rather odd confession: I have become militantly anti-perspectival in this, the maturity of my adolescence. It might be considered 'odd' because the battle over perspective was fought early on during the culture wars and is mostly thought, at least in humanist disciplines, to be a settled matter.² It is not a settled matter for me because a stealth form of perspective controls our digital lives. The argument goes something like this: perspective is a subset of projective geometry. The analytic form of projective geometry is linear algebra. Linear algebra underpins the algorithms that determine our digital footprints as we work and play: searching and drawing to what is thought to be a brave new world.³

Far more tangible, it is not a settled matter for me because, especially in the practice of architecture (including the acts of design, education and reception) we seem to have nothing with which to replace perspective as the *language of vision*.⁴ The situation might be characterised thus: we all understand that perspective is a contested (if not thoroughly discredited) discourse but we do not seem to be able to look away or rather wherever we look all there is to see are objects embedded in a propositionally infinite spatial expanse. In this context, it is clear to me, that the embedding medium of bodies, buildings and brains is not space – unbounded emptiness as

is suggested by perspective – but light. Perspective is a fiction, a Truth (capital T) of ideation we confuse with the process of seeing. Seeing is better characterised as bringing objects and environments to light.

This notion, that light is the medium in which we perform architecture, is both commonplace and radical. Commonplace in the sense that it is a matter of uncommon, common sense: no light; little sight, no sight; no shape, no shape then space becomes exclusively acoustic. As Lawrence Gowing observed in 1952: 'All that the eye can possess is light.'⁵

The radical flip of this particular coin is the idea, increasingly commonplace in cybernetics, visual science and neuropsychology that the visual light field does not just adhere to the objects, but is equally defined in the empty space between the objects. In that sense, the ontological status of the visual light field is akin to that of visual space as a 'container'.⁶

The 'architectural vocabulary of morphogenesis' explores an alternative to the tyranny of perspective in *surface theory*. The goal is to develop architecture in a non-perspectival frame, indeed without the perspective frame altogether and in the context of cognitive activity patterns.⁷ Morphogenesis is at the center of the inquiry.

Architecture, indeed all intellectual disciplines,

borrow the concept of morphogenesis from developmental biology where it pertains to fetal growth. It is a beguiling question: what is the mechanism of development such that something as complex as a conscious being is formed from a fertilised egg. Mechanism is likely *not* the right word unless one thinks of mechanism without a mechanic and the mechanical as *flow* – loopy processes in which emergent qualities are part and parcel of form evolving form.

What does it look like making design analogue to fetal development? On the most abstract level, the ‘ontological perspective’, morphogenesis studies processes in which matter actively co-produces its own formal expression.⁸ Humberto Maturana and Francisco Varela, in a famous work from the early 1970s called this *autopoiesis*.⁹ The term (from Greek αὐτο- [auto-], meaning ‘self’, and ποίησις [poiesis], meaning ‘creation’) refers to a system capable of reproducing and maintaining itself. I don’t know about you but I own a house and it is very far removed from being ‘capable of maintaining itself.’ But let us not crack wise. The idea of self-sustaining structures is an ideal at the very center of current architectural discourse. Why? Because in order to meaningfully address climate change in our buildings, cities and regions, exactly what we must figure out is how to make structures autopoietic.¹⁰ Buildings in the anthropocene *must* be autopoietic on purely existential grounds. The first decisive step in this process is moving beyond our learned prejudice of embedding objects in three-dimensional spatial expanse. This suggests another sense in which morphogenesis is relevant to architecture.

It has to do with the evolution of form in *perception*. Crucially, one must assume that the default condition of objects is that they are in constant motion. The root cause of the motion is moot – either the subject is moving or the object is moving, or both. Perceptual models that assume stationary

observers and static objects (as most perspectival models do) are highly unlikely scenarios, as is the kluge that renders motion a series of static images succeeding one another below the threshold of fusion.¹¹ The conditions with which we must concern ourselves are in constant motion, almost always at multiple scales.

The evolution of form in perception, this other morphogenesis, I shall call *perceptogenesis*. Perceptogenesis is the mirror of autopoiesis, related to the evolution of form in development but subject to different constraints. This essay, an examination of some of these constraints, proposes another so-called *language of vision* grounded in the evolution of form in light.

Developing the vocabulary

Speaking practically, I had a relevant experience in studio reviews with students who were designing using a formal vocabulary best characterised as biomorphic. I was quite impressed with the work of one student in particular. It showed a real flair for the non-carpentered envelope and even though the plan suffered from the difficulties endemic to such work, the project was satisfying. But as the conversation progressed it became clear that we had no vocabulary (certainly no common vocabulary) with which to speak about the work. This happened more than once. The problem is that these conversations very quickly devolve into ‘I like / don’t like ...’ – matters of opinion with no real basis on which to take principled positions or even explore alternatives.

This is unfortunate because a geometrical vocabulary for such formal explorations is at hand and has been for almost 200 years. Of course, I am referring to Carl Friedrich Gauss’s foundational work in differential geometry, *General Investigations of Curved Surfaces* of 1827.¹²

The basic ideas are quite simple. What we might call the Cartesian plane can be generalised to describe all surfaces including curved surfaces.¹³ What these surfaces have in common are: 1) lines (or axes) of principle curvature that can be shown to be at right angles and 2) a classification of these in terms of the relationship between their principle curvatures. Amazingly, somewhat counter-intuitively, only three types of surface are possible: surfaces of positive curvature, surfaces of negative curvature and surfaces of zero curvature.¹⁴ Positive curvature is where the lines of principle curvature when multiplied, yield a positive number—in this case a surface with axes arcing in the same direction. Negative curvature is where the axes arc in different directions (their product is negative); and zero curvature is where one (or both) of the axis lines are straight (of zero curvature). Got it? Generically there are three types of surface: cup, saddle and sheet.

At the risk of belabouring the point, allow me a couple of clarifications. First, surfaces of zero curvature may be, for instance, planes or cylinders or cones. It is obvious why planes are of zero curvature but cylinders and cones are perhaps less so unless one returns to Gauss's definition. Given a surface where one axis is a straight line (of zero curvature) then the product of two axes is zero no matter what the curvature of the other axis is. These kinds of surface may take the form of cylinders or cones, among others.

Secondly, it is characteristic of perspective that it associates objects and their embedding medium. This causes problems for our understanding of geometries that are both simpler (less rule bound) and more complicated (more rule bound) than projective geometry. Regarding more rule bound systems such as Euclidean geometry, it is easy for us to anachronistically embed figures in spaces and very difficult for us to creatively re-think our way into

a gestalt that views a figure (and its transformation) in itself. This is a learned prejudice. It presupposes a definition of transformations as operations between spaces that carry the figure along as one maps one field onto another. A shorthand for the distinction between transforming figures and mapping fields is the difference between *in* and *of*. Regarding surfaces, one can take a view *of* the surface – a field mapping that implies the view from without, or a view *in* the surface – a transformation engendering a view from within. In many cases this is a distinction without a difference, in others it is of crucial import.

Likewise, in geometries simpler than perspective, when presented with surfaces like saddles, cylinders and hemispheres, we suppose ourselves to be outside the surface regarding the spatial envelope *and* its extensive objects. In this case the distinction *of* the space / *in* the space – what above is a basically psychological distinction – can be given a rigorous formulation in geometry. This category shift leads to one of Gauss's fundamental findings. He described it as the difference between *extrinsic* and *intrinsic* geometry. Perspective is an extrinsic geometry because one may transform any four points of the image to any four points in the ambient array, thereby determining a unique projective transformation of objects in spaces. It is the virtue of perspective that one may explore the entire ambient array this way, as it is given from outside. Gauss, on the contrary, posited a geometry where a shape, a surface, a figure *is* the space. In Gauss's words:

When a surface is regarded, not as the boundary of a solid, but as a flexible, though not extensible solid, one dimension of which is supposed to vanish, then the properties of the surface depend in part upon the form to which we can suppose it reduced, and in part are absolute and remain invariable, whatever may be the form into which the surface is bent. To these latter properties, the study of which opens to geometry a

new and fertile field, belong the measure of curvature and the integral curvature, in the sense which we have given to these expressions.¹⁵

One of the implications of Gauss's invention (discovery?) is that surfaces may be transformed into other surfaces of *the same kind* but never into surfaces of a different kind.¹⁶ This is breathtaking. If one restricts the notion of change to transformations that preserve continuity, then such surfaces have an integral curvature that uniquely generalises them as a family that can be one of only three kinds: positive, negative or zero. Perhaps more importantly, this suggests that perceptogenesis – the sensation of surface in light – may be, *must be* experienced (assuming we are operating at a primitive visual level) from *within* the shape itself, i.e. intrinsically.

The architect in me feels compelled to state the obvious: there is really only one kind of surface, what might be called a hybrid surface. This suggests another finding of Gauss's differential geometry: there exist seams between patches of differently curved surfaces in hybrid forms and these lines are said to be 'invariant.' They are called *parabolic lines*.¹⁷ This is not because they take the shape of parabolas. It is, and this is conjecture, because parabola (from Ancient Greek παραβολή – *parabolé*) means juxtaposition or comparison. Parabolic lines are the joints or lines of juxtaposition between different surface types.

Fostering visual morphogenesis

The assignments devised for this, my first year studio, were designed to introduce architecture students to this concept of invariants as expressed by ever more sophisticated geometric transformations. The final module of the class, immediately preceding the final project and to some degree coincident with it, asks the students to take an irregularly shaped, non-carpentered object, find its parabolic lines and draw those lines on the object

itself [Figs. 1-3]. These objects, which I call surforms or 'forms comprised of surfaces' are 3D models of analytically determined mathematical objects used in the psychophysical experiments of James Todd.¹⁸

The goal in developing these ideas in a first year studio is to introduce students to ways of looking that allows them to analyse and discuss biomorphic form. Let me be clear: I am not interested in promoting biomorphic form in architecture nor am I suggesting in any way that the most interesting problems of form are doubly curved surfaces. Personally, I'm not much interested in the architecture of blobs. What I am interested in ways of seeing and deeply invested in fostering critical dialogue around form, form making, the perception of form and, most important of all, the inhabiting of built form. I believe that the introduction of Gauss's intrinsic geometry creates a foundation that promotes a unique and previously unarticulated way of negotiating architectural form that is fundamentally different from perspective. I hope such exercises might: 1) foster a view from within, thereby promoting object space/times synoptic with place; 2) elaborate the ways architecture and design are critically dependent on seams, edges and transformations (not new but using an expanded – parabolic – definition of edge); 3) introduce the notion of a first-person inquiry as distinct from a third-person interrogation; 4) promote allocentric rather than egocentric attitudes; 5) favour intrinsic as opposed to extrinsic approaches; 6) recreate structure as autopoiesis founded on perceptogenesis; and 7) elaborate the ways that light is the embedding medium of building.

Now, in retrospect of this educational experiment, I find myself even less tolerant of perspective, the humanist debate around perspective and the encoding of perspectival prejudices in digital networks. In short, we do our students a grave disservice educating their seeing in perspectival modes. Instead we must work to put perspective in

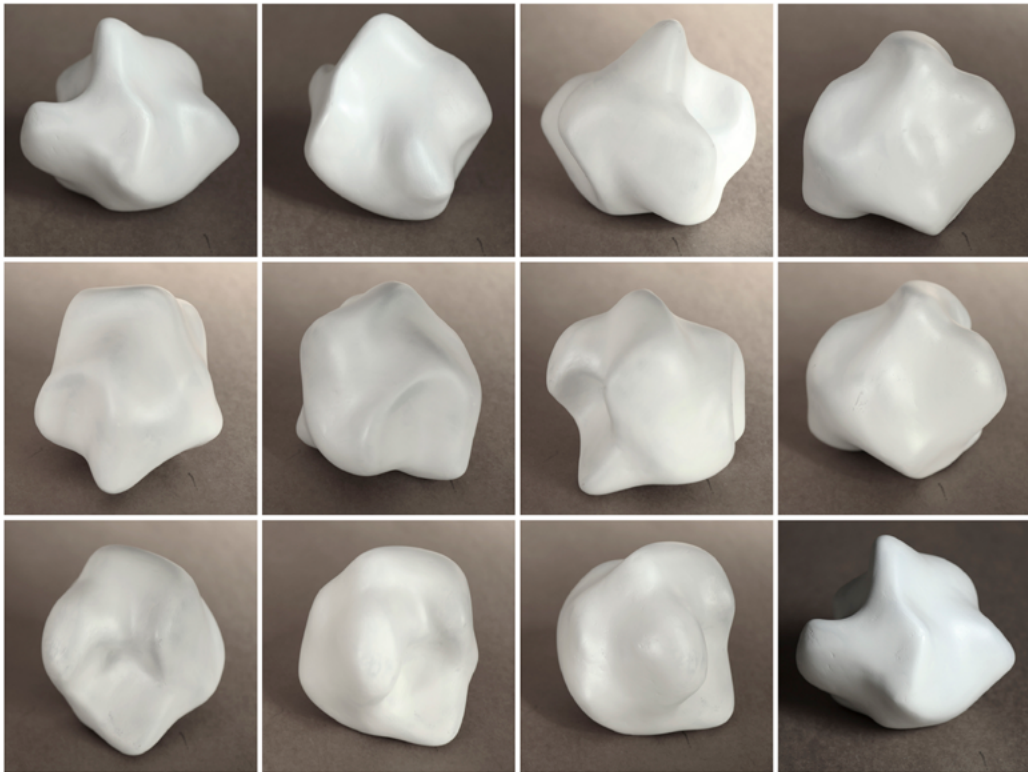


Fig. 1: A pristine surform from multiple angles, after surfacing. The students were working in groups of three to five people. There were five groups. Each group was given their own surform that they were required to prepare by coating and sanding and on which they were to draw. No one in the class seemed to notice that all the surforms were identical. I did not contradict that misapprehension. Image: author.

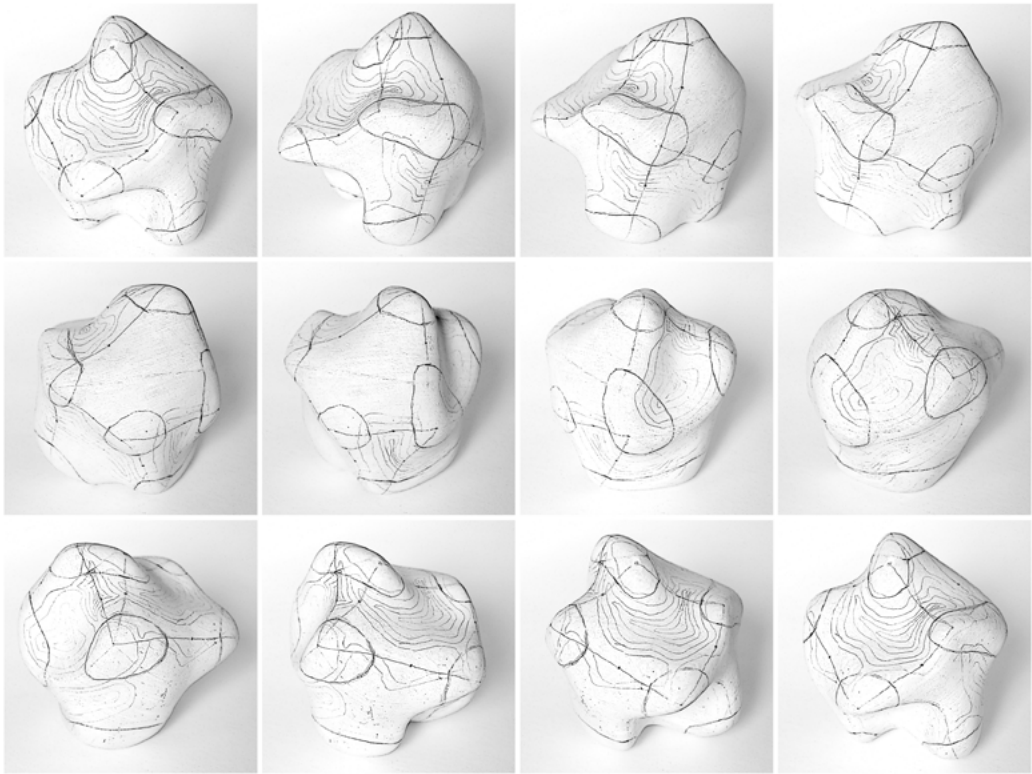


Fig. 2: There are several different ways one may approach finding parabolic lines on surforms. In the 'constructive' approach one locates the Morse critical points, the so-called peaks and passes, and then connects those with 'ridge' lines. After that, paying attention to each ridge, identify the points where the line goes from being convex to concave. That is a point of inflection. With those inflection points anchoring the process, one may then locate the parabolic lines as seams connecting the ridge line inflections. Image: author.

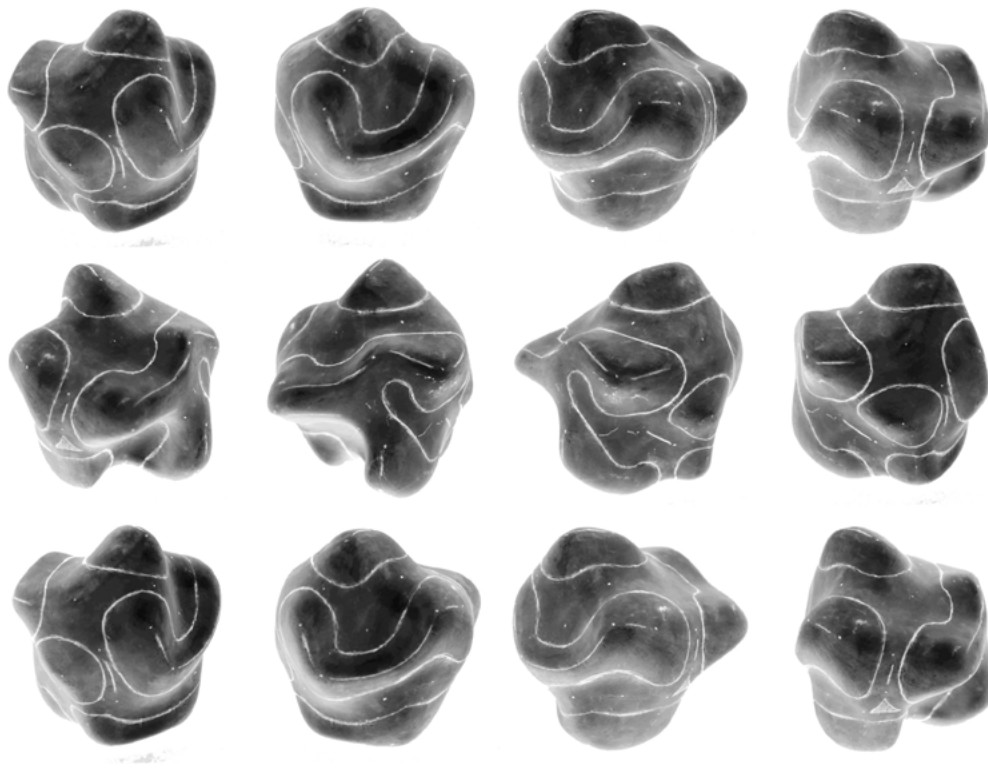


Fig. 3: One precocious student worked without a net, as it were. She simply regarded the surform as an object and 'read off' the lines that acted as 'edges' separating the surfaces of positive and negative curvature. No construction lines needed. Acquiring this skill – reading the edges of biomorphic forms as easily as one reads the boundaries of crystalline forms – is one result expected of this educational experiment. Image: author.

its place as one among many geometries. We could teach the fundamentals of similar, affine, inverse, differential and topological geometries as real alternatives to perspective, a system that above all frames and embeds. One unintended consequence of such an approach might be citizens equipped to better evaluate the way algorithmic tools based on mathematical systems influence our decisions in the world. More relevant for architecture might be a shift away from frozen metaphors of biomorphic forms towards explorations that evolve structures from perceptual processes and envision buildings as organisms developing in slow time in symbiotic relation with their environments. This might go a long way towards embodying human minds continuous with physical nature, further deploying an architecture that meaningfully addresses catastrophic environmental change.

Notes

This is a review article related to the course Arch108; taught in the spring of 2017; the faculty of the School of Architecture, University of Kansas; coordinated by Anne M. Patterson.

1. Jason W. Brown, *Gourmet's Guide to the Mind* (Brussels: Les editions Chromatika, 2011), 89. Brown elaborates this aphorism thus: 'A subjectivity of the inorganic that is continuous with human mind is a theory of mind continuous with physical nature. ... The appeal to process thinking of a genetic psychology rooted in subjectivity is that patterns in the actualization or becoming of the mental state can be mapped to features in the concrescence of physical entities that would otherwise be opaque to causal science.' Jason W. Brown, *Neuropsychological Foundations of Conscious Experience* (Brussels: Les editions Chromatika, 2010), 125.
2. I am engaging in a bit of hyperbole here. Of course, the literature on perspective is vast and continues to grow. A prudent qualification might be: "logocentric scholars" or "scholars reflexively adopting a post modern attitude." Hal Foster, *The Anti-Aesthetic: Essays on Postmodern Culture* (Port Townsend: Bay Press, 1983).
3. For an exposition of search algorithms see Dominic Widdows, *Geometry and Meaning* (Stanford: CSLI Publications, 2004).
For an exposition of CAD algorithms see Wolfgang Bohm, Gerald Farin, and Jurgen Kahmann, 'A Survey of Curve and Surface Methods in CAGD', *Computer Aided Geometric Design* 1, no. 1 (1984): 1–60. I intend all the sarcasm Huxley's *Brave New World* intones.
4. The notion of *languages of vision* is exceedingly problematic for me. Rather than unpack it here, suffice it to gesture towards Robin Evans: 'Those of us who are wary of words would judge the excellence of a work of visual art by the degree to which it is unsullied by them. This cannot be right. It simply reverses a recurrent phobia ... Attempts to prove either that the visual arts are languages or that they are independent of language are equally wide of the mark. In the whole gamut of art, only vision and language count for much, and each is deeply imbued with the other.' Robin Evans, 'Mies van der Rohe's paradoxical symmetries', *AA Files* 19 (1990): 60.
5. Lawrence Gowing, *Vermeer* (Berkeley: University of California Press, 1997), 32.
6. Jan J. Koenderink, S.C. Pont, Andrea J. van Doorn, A.M. Kappers, and J.T. Todd, 'The Visual Light Field', *Perception* 36, no. 11 (2007): 1596.
7. As Paul Weiss observes: 'You may sense already my own design. It is to reorient thinking from static *form* to formative *behavior* across all orders of magnitude.' Paul Weiss, 'One Plus One Does Not Equal Two', in *The Neurosciences: A Study Program*, ed. Gardner C. Quarten, Theodore Melnechuk and Francis Otto Schmitt (New York: Rockefeller University Press, 1967), 808.
8. This definition is lifted from the *Footprint* call for papers: 'from an ontological perspective, morphogenetic studies deal with the processes in which matter actively co-produces its various formal expressions ... one that examines the reciprocity of formal emergence.'

9. Humberto R. Maturana, and Francisco J. Varela, *Autopoiesis and Cognition: The Realization of the Living* (Dordrecht and Boston: D. Reidel, 1980 [1972]).
10. Patrik Schumacher has marked *autopoiesis*. Do not assume his elaboration of parametric architecture is related to my argument here. To be or not to be parametric misses the point in a way analogous to be or not to be 'modern' misses the point. The crux is what parameter one chooses to render and whether or not the rendering is actually dynamic or just a simile of objects evolving in time. Patrik Schumacher, 'Parametricism and the Autopoiesis of Architecture', *Log*, no. 21 (2011): 62–79.
11. A kluge is a quick fix that works. Andy Clark identifies this as a central design feature of cognitive architectures as they evolve from 'speedy sensorimotor processing' to something 'capable of sequential conscious reasoning'. Andy Clark, *Microcognition: Philosophy, Cognitive Science, and Parallel Distributed Processing* (Cambridge, MA: MIT Press, 1989), 134. In this case the kluge is an assumption by experimental psychologists that the algorithms of sensorimotor processing mirror the physics of motion.
12. Carl Friedrich Gauss, ed. and trans. James Caddall Morehead and Adam Miller Hildebeitel, *General Investigations of Curved Surfaces of 1827 and 1825* (Hewlett: Raven Press, 1965 [1902]).
13. By 'generalised' I intend 'rendered generically.' Generic surfaces in this context are surfaces that when slightly perturbed preserve their defining characteristics such as intrinsic curvature.
14. This statement should be qualified: 'in low dimension.'
15. Gauss, *General Investigations*, 21.
16. Technically Gauss's *Theorema Egregium* shows how a surface whose principal curvatures, when multiplied and found equal, can be continuously transformed into each other.
17. Parabolic lines, in this sense, are what I think Deleuze regards as 'folds' i.e. le pli. I am frankly not entirely sure because the argument is obscure in Deleuze and obfuscated in Greg Lynn, *Folding in Architecture* (London: Architectural Design Magazine, 1993). By contrast, in the mathematics of Gauss it is marvelously clear. Regarding the recent history of 'the fold' in architectural theory, I follow the lead of Mario Carpo in *The Second Digital Turn: Design Beyond Intelligence* (Cambridge, MA: MIT Press, 2017) and especially *The Alphabet and the Algorithm* (Cambridge, MA: MIT Press, 2011).
18. James T. Todd, 'The Visual Perception of 3D Shape', *Trends in Cognitive Science* 8, no. 3 (2004): 115–21.

Biography

J.M. Rees directs a design practice based in Kansas City, Missouri. Within the framework of a business established in 1958, Rees designs envelopes, interiors, furniture and surfaces. His approach is analytical, site specific and multidisciplinary. Rees edited and contributed to the books *The Sixth Surface: Steven Holl Lights the Nelson-Atkins Museum of Art* (2007) and *Urban Stories of Place* (2006). He has shown in New York and Kansas City. Since 2008 Rees has been collaborating with clients, contractors, architects, engineers and manufactures to develop the next generation of high performance homes tuned to conditions particular to Kansas City.

Review Article

The Explorative Strategy of Engagement Atelier Bow-Wow's Rebière Street Project in Paris

Johan Nielsen, Yves Schoonjans and Kris Scheerlinck

Atelier Bow-Wow in Paris: emerging practice in globalisation

Between 2006 and 2013 the Japanese office Atelier Bow-Wow realised an architectural project on the Rebière Street in Paris, France, in the framework of the Porte Pouchet renovation project. This project is characteristic of contemporary emerging practices in architecture. As a matter of fact, within the opportunities offered by the development and transformation of globalisation, architectural offices have more and more assignments on remote locations far from their home office. This becomes extremely interesting when the office itself does not only have a discourse based on local anchorage such as Atelier Bow-Wow, but is also eager to design in a remote location. The study of the design processes in this paradoxical condition can provide valuable insights in contemporary architectural production.

The Rebière Street project comes within the context of the renovation project of the ZAC (Zone d'Aménagement Concerté) Porte Pouchet, a site situated at the north-west of Paris, near Clichy and Saint-Ouen. In 2001, the municipality of Paris launched a Grand Projet de Rénovation Urbaine (GPRU) to reconsider several neighbourhoods situated in that zone near the Boulevard Périphérique. In 2003, the definition studies were started and a master plan was elaborated by the urban planning office TVK (Trévelo & Viger-Kohler architectes urbanistes) in collaboration with MG-AU (Michel Guthmann architecte). The Rebière Street was a 25m wide street bounded by the wall of the

Batignoles Cemetery and a nineteenth-century city fabric. The masterplan detected two major potentialities there: the important vegetation of the cemetery and the possibility to reduce the width of the street to 12,5m to free buildable space. Thus, the idea of declassifying a portion of the street, to reduce its width and to build 180 apartments in the resulting free strip was born. As visible in Fig. 1, this strip was divided in plots and assigned to different architectural offices with the task of developing them with a certain level of coherence. A collective design process was organised under the supervision of the Parisian office Périphériques Architectes.¹ The development of the projects was organised around several workshops and presentations to the inhabitants. Named *Autrement rue Rebière*, this collective process had an ambition of innovation in design practice. The supervisor invited Atelier Bow-Wow to submit a proposal for the project and the Japanese office was selected. Simultaneously Périphériques asked Parisian office Brunquell & André Architectes to operate as local architect and to provide them full support. From the very beginning Atelier Bow-Wow involved the Parisian office in the project development as partners in the design process.

Globalisation and local anchorage: the construction of commonalities

To understand how form is produced in such remote practice conditions, reading tools based on the sociology of engagement introduced by French sociologist Laurent Thévenot can be helpful. His

sociology provides concepts that prove highly relevant to describe the collective dimensions of the design process in architecture, the role of process stakeholders such as remote and local architects, clients, engineers and consultants and how collective agreements are granted and implemented, without altering the richness of the broad range of fine nuances in the behaviour of social actors. For Thévenot the primary relation to the environment coincides with a regime of engagement based on familiarity. Yet, the specificity of a remote practice is that there is no familiarity. The relation to the environment and the local anchorage are *de facto* mediated. This mediation takes different forms: transfer of concepts, means of communication, and empowerment of contact persons. We will see that these forms of mediation are not dependent on personal accommodation and therefore imply a systemisation of the architectural process. The legitimacy of this systematisation is by nature questionable by others and can be a source of doubt or anxiety among the stakeholders.² Addressing the design process in relation with the idea of *scale of confidence*, that is to say linking the design with its effects in terms of trust and anxiety provoked among the stakeholders, is a conceptual shift. It is necessary to carefully decompose the process of mediation in the case of Rebière Street, to understand how the systematisation of the process is constructed, how it influences the design and to analyse how the designer counterbalances this influence with strategies aimed to anchor the project in local identities.

Two notions in the theory of engagement are relevant to analyse these strategies. First, the notion of *seizure*, seen as the moment of the engagement in an activity and the making sense of a reality by the means of knowledge and informational markers.³ Secondly, the notion of *adherence* must be introduced. Adherence is a metaphor pointing to the dimension of trust in every regime of engagement as opposed to the dimensions of doubt and anxiety.⁴

In the case of Atelier Bow-Wow in Rebière Street the coordination between seizure and adherences leads to what Thévenot identifies as an explorative regime of engagement⁵ in the sense that the design process reflects a desire for assurance of the excitement of the new.⁶ This regime of engagement will in turn support cutting edge design strategies able to fully embrace the unavoidable dimension of uncertainty of such public projects.

Operating seizure of the context and coordinating in the distance

In the design process of Rebière Street, the first part of the seizure of the local dimensions was held on a familiar regime of engagement. Indeed, Yoshiharu Tsukamoto – who studied in Paris for a part of his architecture degree – made several trips to Paris during the collective design phase and took part in the different workshops. This allowed a form of complicity in the collaboration between the local and the remote office and Tsukamoto's personal engagement in the design process. In particular, Xavier Brunnequell mentions trips through the city of Paris on a motorbike together with Yoshiharu Tsukamoto as a strategy to seize references in the Parisian urban fabric for the project.⁷ The second part of the seizure was the communication and coordination with local stakeholders: the designers of the adjacent plots, the client, the consultants and engineers, the administration and the contractors. In general terms, the discussions with the designers of the adjacent plots were held by Tsukamoto at the workshops and the contacts with the client, the consultants and engineers, the administration and the contractor were held by the local office. The third part of the seizure touches on local standards such as energy efficiency regulation, urban rules, quality standards, fire regulation and rules for mobility-impaired persons. These dimensions of the local context were seized by means of precise graphical documents prepared by the local office in Paris and sent to Tokyo by email. The need for coordination during the design process was largely fulfilled by a



Fig. 1

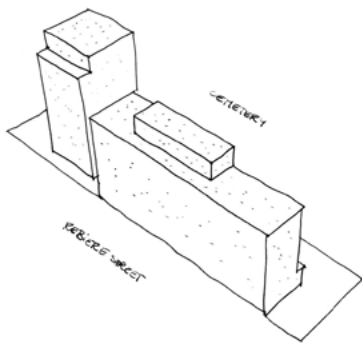


Fig. 2a

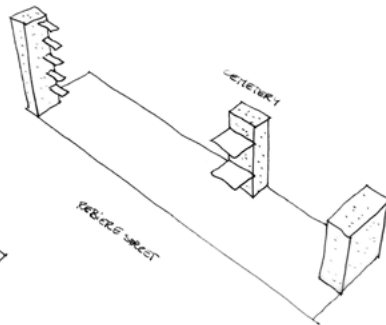


Fig. 2b

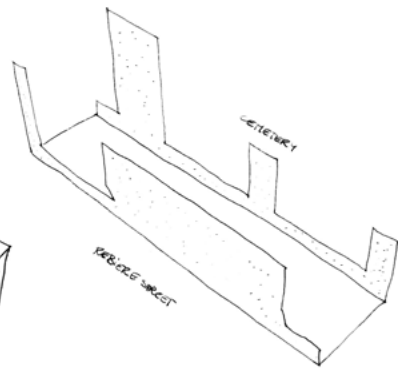


Fig. 2c

Fig. 1: Elevation of the different projects of Rebière Street (partial), Bow-Wow project in blue. Image: Zora Starcevic.
Fig. 2a, b, c: First version of Atelier Bow-Wow's project for Rebière Street. Schemes: Johan Nielsen.

French architect, Simon Morville. By means of an academic exchange programme between France and Japan and work opportunities he became the person in charge of the project all along the different phases of development, first in Tokyo and then in Paris.

Creating adherences: reconstructing familiarity

At Rebière Street Atelier Bow-Wow chose elements that would act as structuring references in the design. These references have to be legitimate in the way that they must have the capacity to be shared by other stakeholders and, beyond this, by future anonymous users. This search for shared references can be seen as an attempt to create adherences in recreating a feeling of familiarity. This strategy appears clearly in different phases of the project. The first version of the project was a piece of research on the general silhouette of a Parisian common wall considered by Tsukamoto as a central reference. In this version, two blocks contain the apartments: a small tower situated along the cemetery limit and a block situated on the street limit. [Fig. 2a]. Outside collective circulation is organised in vertical steel staircases and suspended walkways covered by vegetation. [Fig. 2b] The project is structured around the impact of the volumes upon the limits of the plots, considered as abstract *common walls*. [Fig. 2c] After this first proposal the continuation of the design process is characterised by a methodical search for suitable typologies opening up and intensifying the search for references. The search is made through the production of an important number of physical models as shown in Fig. 3, all developed at the office in Tokyo. This methodical search ends up in the definition of a typology inspired by anonymous and common references among Parisian architecture. Together with the conceptual work on common walls, it corresponds to a search of what Atelier Bow-Wow calls *Paris-ness*, as a legitimate reference to ensure familiarity.⁸ To fully deploy this idea of referring to familiar architecture,

Atelier Bow-Wow operates another design strategy: a variation of scale into the reference. Indeed, in its final version the project presents two typologies: an apartment block and two houses. [Fig. 4] The final version of the project features at the same time one of the biggest buildings of the Rebière Street (the apartment block) and the smallest (the houses). By doing so, Atelier Bow-Wow outlines a range of possible variations of the same Parisian typology framing it with two opposite building sizes. This is a strategy to present a familiar typology to the user and to trigger a sensitive perception of this typology and its potentialities. More than a figurative reference, the typology refers to a conceptual idea of what makes the identity of Paris.

At a more detailed level, Atelier Bow-Wow enriches its constitution of adherences by integrating architectural artefacts that will work as familiar references in the project, notably covered circulation space in the form of arcades at the ground level of the apartment block and dramatically shaped balconies and full height windows at the upper floors. The arcades are essential in the structure of the building and can be considered as part of the project's backbone. As we will see, they play a structuring role for the outer spaces all along the design process and link the different parts of the project from an early stage of the design. The balconies and the full height windows, references to the Parisian balcony, structures the link between the apartments and the exterior as it will be developed below. The work on typologies and the choice of the arcades and the balconies must be understood as an attempt to engage three major shared references on a figurative, spatial and conceptual level. They are aimed to allow the stakeholders to structure the design intentions by reconstructing familiarities. We can state that the sensitivity obtained by the seizure operation is translated in artefacts that function as carriers of meaning in context. The result is a project that subtly quotes and questions the Parisian context.

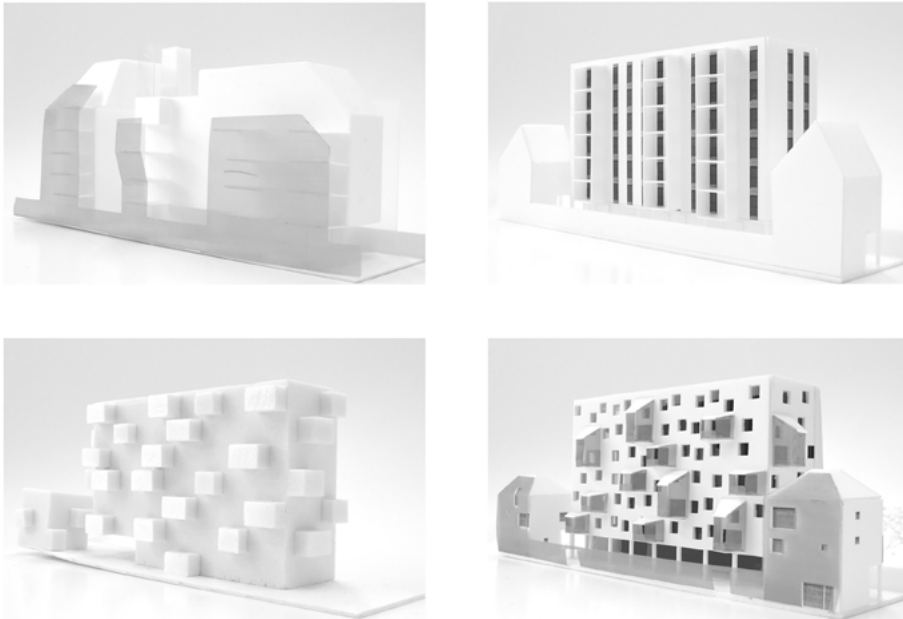


Fig. 3



Fig. 4

Fig. 3: Intermediary architectural study models of the project. Courtesy of Atelier Bow-Wow.

Fig. 4: Model of the final proposal for the project. Courtesy of Atelier Bow-Wow.

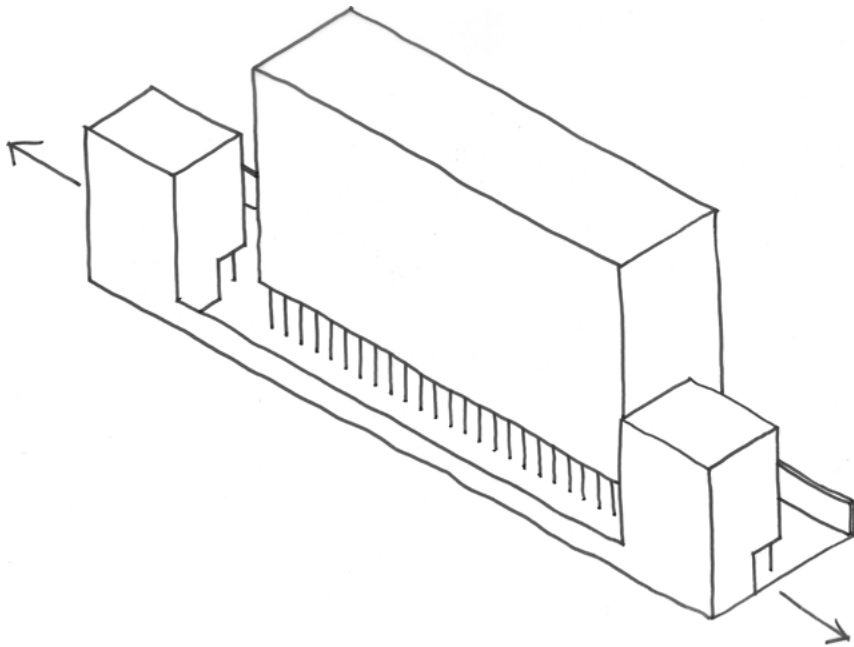


Fig 5: Intermediary study version of the project with the connecting arcades. Scheme: Johan Nielsen.

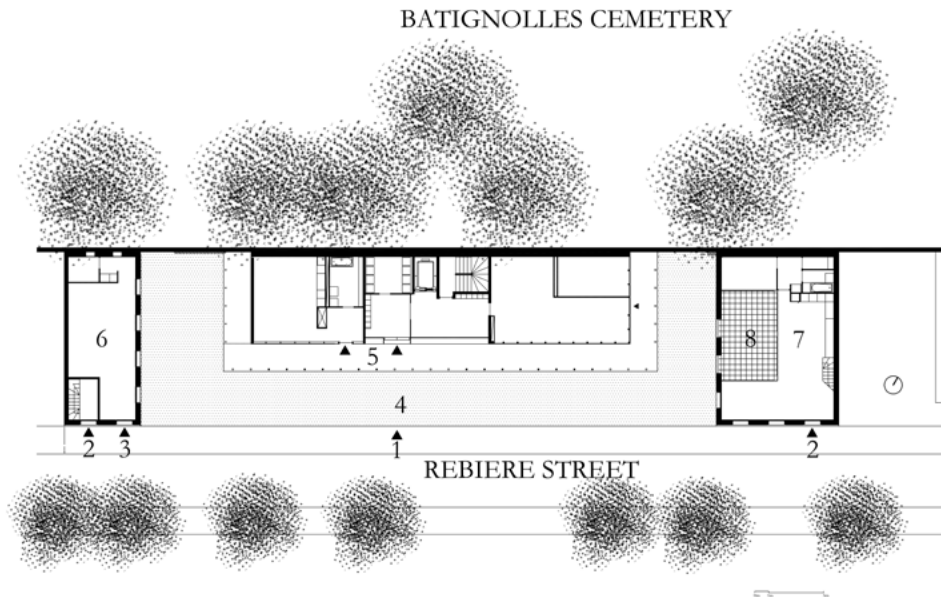


Fig. 6: Floor plans of the final proposal. Ground floor at the top. Key: 1. Entrance to collective space; 2. Entrance to dwelling; 3. Entrance to collective facilities; 4. Collective space; 5. Arcades; 6. Collective facilities; 7. Dwelling; 8. Patio; 9. Bedroom; 10. Terrace garden. Image: Author.

**The second side of remote engagement:
designing with the uncertain**

So far, we have seen that the coordination of the operations of seizure and the reconstruction of adherences allows Atelier Bow-Wow to assuage the anxiety or doubt caused by the introduction of means of mediation in this design process, means of mediation being inevitable because of the remote practice conditions. We can argue that this coordination backs an explorative regime of engagement of the Japanese office. An explorative regime of engagement, as defined by Thévenot, is a regime based on intimacy and that is related to doubt, anxiety and uncertainty. To grasp the complex plurality of senses of reality we must not only consider familiarities but we also have to see these aspects as resources. To consider an explorative regime of engagement pushes us to consider doubt, anxiety and uncertainty as positive assets.

In the Rebière Street case, during a workshop session at an early stage of the design process, the architects of the different plots decided by mutual agreement to give a general coherence to all the plots by developing a continuous collective space across all the different projects along the street. This proposal – aimed to reinforce the link between the different projects – was abandoned.⁹ This abandonment weakened the collective space in many proposals, particularly at the connection with the neighbouring projects. Nevertheless, this idea played an important role in Atelier Bow-Wow's project. In an early stage, when the connections with the neighbours were still possible, the two houses on the side of the project were not as long as the plot and the arcades were a promenade carved out in the three buildings. [Fig. 5] At the final stage, the project is now constituted by an apartment block and two houses. As visible on the plans the two houses are extended along the entire depth of the plot and two private outer spaces frame the collective space while a direct opening to a collective facility

is created. [Fig. 6] The house at the left contains a community centre with a window toward the outer collective space. But it also contains a dwelling with an outer terrace garden between two private façades at the second level. This terrace garden, defined by intimate façades (the façades of the two bedrooms) and indirectly linked to the collective space underneath, has been appropriated by the owners and transformed into a lush garden with plenty of plants. On the other side of the plot the house at the right is a patio house with a narrow standing volume at the front. Here too, the outer space of the patio and the perpendicular façades – a result of the very thin typology – work as a nuanced limit of the collective space.

The architect worked with intimate spaces (terrace garden and patio) and façades with intimate space windows. The arcade is transformed in a long wood-cladded porch at the foot of the central building and a planted fence is placed along the street limit. In a plot 12,5m deep the resulting collective space is generous and framed by a planted fence, intimacy-nuanced outer spaces – the terrace garden and the patio – and the wood-cladded porch. In this collective outer space hanging balconies are designed as extensions of the apartments. The balconies have different sizes, randomly distributed along the façade and dramatically expressed. They act as a threshold between the inner family space, the outer collective space and the public space. Today they are invested by the inhabitants who appropriated these spaces with intimate artefacts such as plants, little windmills and furniture. The achievement of these balconies is the result of the explorative regime of engagement by Atelier Bow-Wow and Brunnquell & André Architectes.

The design of the collective spaces of this project can be considered a risky gamble: the less controllable part of the project becomes the most significant feature of the building. The balconies are



Fig 7: The balconies appropriated by the users as major feature. Photo: Johan Nielsen.

the major architectural expression and their quality largely relies on the investment by the users. In that sense, the side of the explorative engagement related to doubt, anxiety and uncertainty is tackled as a design quality, opening up a perspective toward the idea of *uncertainty-in-designing* as a source of spatial quality.

Conclusion

The review of the Rebière Street case illustrates the emergence of a certain kind of practice in the globalisation we currently face. In a market dominated by standardised architectural production or by strategies organised around celebrity, some offices strive to build in remote locations with the ambition to incorporate local dimensions in their projects. Technology, exchange programmes and global communication allow these offices to develop projects abroad. To understand and describe these practices, the sociology of engagement developed by Thévenot is of great value. This sociology invites us to focus on the quality of the link between the project stakeholders and its impact on the design. In this regard the idea of scale of confidence is central. It allows us to embrace the range of nuances in behaviour and decision-making. From systematisation to intimate engagement, the scale of confidence brings fresh and new perspectives in understanding the production of form.

Furthermore, the examination of a design process submitted to remote practice conditions provides relevant insights in the way architectural form is currently produced. In the case of Rebière Street, Atelier Bow-Wow achieved the coordination between local dimensions and remote practice conditions through the implementation of an explorative strategy of engagement and a confidence in the exploration of the unexpected.

Nevertheless, the poor dialogue with the neighbouring plots resulted in unresolved aspects of parts of the project. Surprisingly, the common

walls – so important in the design process – look like backsides. Likewise, the ground level and its relation to the public realm suffer from the lack of spatial presence of the fence. Furthermore, the design does not make use of the full potential of architectural details. Confronted with the reality of local building processes and the mechanisms of French public contract procedures, the project, as designed by Atelier Bow-Wow, was ultimately substantially revised. The resulting simplification can be seen as a loss of quality, but also reinforces the radical expression of the project. It appears as unfinished and austere blocks, welcoming intimate and concrete traces and expressions of the life of the inhabitants.

Notes

This is a review article of the project of 21 housing units, a youth centre and collective spaces by Atelier Bow-Wow, built in 2013 at Rebière Street, Paris, in the framework of the Porte Pouchet renovation project.

1. Périphérique Architectes, Autrement rue Rebière, *Un workshop organisé par l'OPAC de Paris pour la création de 180 logements rue Rebière dans le cadre du Grand Projet de Renouveau Urbain de la porte Pouchet à Paris 17e* (Paris: éditions de l'Arsenal, 2007).
2. Paul Blokker and Andrea Brighenti, 'An Interview with Laurent Thévenot: On Engagement, Critique, Commonality, and Power', *European Journal of Social Theory* 14, no.3 (2011): 394.
3. Laurent Thévenot, 'Un gouvernement par les normes, pratiques et politiques des formats d'information', in *Cognition et information en société*, ed. Bernard Conein and Laurent Thévenot (Paris: Editions de l'Ecole des Hautes Etudes en Sciences Sociales, 1997), 206.
4. Blokker and Brighenti, 'Interview with Laurent Thévenot', 395.
5. Ibid, 389 and 395.
6. Ibid, 389.

7. Personal meeting with Xavier Brunnquell, 10 March 2016 in Paris.
8. Personal skype session with Simon Morville on 4 May 2016.
9. Ibid.

Biographies

Johan Nielsen is an architect living and working in Belgium. He is part of the teaching staff at the Faculty of Architecture, KU Leuven, Campus Brussels/Ghent. He is a PhD candidate with a research project entitled 'Space Suitability and the Design Process: a research on the remote architectural practice and local identities'. He is also involved in private practice as director of the Brussels-based office Manger Nielsen Architects.

Kris Scheerlinck is associated professor at KU Leuven and obtained a PhD in Architecture and Urban Projects (UPC/ URL, Barcelona, Spain). For more than fifteen years, he ran his own research and design practices. He is currently head of the research group 'Urban Projects, Collective Spaces and Local Identities' and director of NYhub, a KU Leuven research and design platform in New York City. He directs an international research project on depth configurations in urban projects.

Yves Schoonjans is a professor in architectural history and theory at the KU Leuven. He received a Master of Science in Architectural Engineering in 1984 and a PhD in 2001. He is currently head of the research group 'Urban Projects, Collective Spaces and Local Identities'. He was involved with and lead coordinator of several international programmes (Erasmus, Mundus, ALFA) and has participated in various projects, especially in Latin America. He was vice-dean international affairs and is now vice-chair of the Research Department.

Review Article

'Des Yeux Qui Ne Voient Pas...' The smartphones

Luca Di Lorenzo

Three of the most influential chapters of *Vers une Architecture* are collected under the common title 'Des yeux qui ne voient pas...': eyes which do not see. Searching out the common architectural edges, Le Corbusier introduces the aesthetics of the machine in the debate about the new style. Liners, airplanes, and automobiles are shown as the expression of the powerful beauty of practical form: honest, simple, functional and technological. An architecture that, coming from precise 'questions' and needs, is perfectly summed up by the revealing comparison between the Parthenon and the Delage Grand-Sport, both products of a selection applied to a standard. These very famous pages remind us that form is not only derived from precise typological choices or from reasoned morphogenetic diagrams, but it could also be a direct expression of the *Kunstwollen*: 'Our own epoch is determining, day by day, its own style. Our eyes, unhappily, are unable yet to discern it.'¹

What are the *paquebots* of the twenty-first century? Which buildings embody this new paradigm?

Since 2007, Apple has produced a new type of mobile phone, equipped with a high-resolution, multi-touch tactile screen, which has revolutionised the entire society: the iPhone. This graphic analysis starts from the statement that one of the 'not seen' features of this era is the smartphone, nowadays an indispensable companion to each of us. The

subject of the survey is the first BMW Guggenheim Lab, designed in 2010 by Tokyo-based firm Atelier Bow-Wow. The pavilion, built in 2011 in First Park, between the Lower East Side and East Village in Manhattan and then transported to Berlin, is an experimental, temporary and mobile carbon fibre structure that challenges the consolidated idea of public space. Described by the architects themselves as a 'travel toolbox' or 'pop-up fly loft theatre in the city', this compact architecture sums up and overlaps the function of a museum, auditorium and cultural centre in a single and compressed space, embodying three interesting formal qualities usually associated with smartphones: the clear division between the hardware and the ergonomic user interface; the possibility to operate different functions (or software) in the same space (or screen); and the real and virtual connection with different urban situations.

It is no coincidence that Atelier Bow-Wow's theories focus on the branch of semiotics that puts the user and his or her behaviour in the foreground: pragmatics. Learning from the *da-me* hybrid buildings of *Made in Tokyo* or the tiny *Pet Architecture* investigated in their two guidebooks, they have come to the definition of architectural behaviourism as the master key that allows them to deal with different urban spaces.² Always considering them as 'environmental units' bound to the urban spatial practice, the Japanese architects want to define 'devices that create social platforms'³, or 'various spirals, eddies

and flows where people converge and disperse ... [and where] daily life is thus reframed, as if by a film or theater director, into something light-hearted, sweet, or humorously self-evident.⁴

Hardware and Interface

The first series of diagrams shows the reciprocal relationship of three elements: the ethereal user's space of interaction, the communicative and/or interactive interface, and the solid and functional hardware. [Fig. 1] The most obvious formal feature of the New York Lab is the strong and clear division between accessible user space, that is the ground floor, and the infrastructural lid or 'toolbox' suspended above it. Screens, lighting technology, audio, curtains, furnishings, stages and other technological tools are crammed into the top half of the structure, hidden by two layers of semi-transparent mesh that create a rippled and lustrous effect. The apparatus of these tools can be, as in a theatre fly tower, lowered or raised to configure the playground below and create infinite functional scenarios in accordance with programme needs.

Viewing it next to the Football Hall of Fame Museum by Robert Venturi and the Sainsbury Centre for Visual Arts by Norman Foster, we can graphically identify the two distinct spaces of infrastructure and interaction and analyse the role of the communicative diaphragm-interface between the two spaces that transforms the components behind it into visible and/or editable contents. Unlike the Venturi project, where the façade/screen, completely separated from the museum and reminiscent of Las Vegas billboards and decorated sheds, responds to the sole purpose of communicating the meanings of the hidden box behind it, in the Foster building, the interactive shell that envelops the highly flexible system of the centre, organises and filters both the technological components concealed in the thickness of the trillithon truss, and the external inputs such as sunlight, ventilation and framed views of

the landscape. Like in the Guggenheim Lab, the Venturian passive spectator is now an active player that shapes his or her own malleable space.

This user-orientated approach is linked to two more key issues: accessibility, a physical and metaphorical openness to the public, and ergonomics, which deals with the human scale. If Foster opens up to the surrounding landscape only along the longitudinal direction, the Lab is potentially fully accessible on four sides thanks to the hardware volume that hovers undisturbed above what Atelier Bow-Wow frequently call 'lively space'⁵. The purpose is to produce a visible and welcoming atmosphere at the street level that can comfortably hold three hundred people and host every possible cultural urban function. This complete openness to the public is both formal and conceptual because all programmes are free and multidisciplinary.

Ergonomics in architectural terms can be translated into two qualities, spatial economy and human scale. The shape of a smartphone is the smallest parallelepiped possible, perfect for hand and gestures. Similarly, the silhouette of the BMW Guggenheim Lab aims at the maximum profit with minimal space. In *Graphic Anatomy* Atelier Bow-Wow, describing their house projects, declares:

We think that the characters of these small houses are like *nigiri* (hand-rolled) sushi. The compact format of a *nigiri* allows the flavors of all kinds of fish to be compared, and differences in the taste, shape, color, and texture of materials are converted into pleasure and richness.⁶

This can be easily extended to the Lab. The structure is, in fact, compact and perfectly wedged between two existing buildings. Its complex hardware system in the loft space is, moreover, fully visible and potentially open source. Venturi's vertical billboard/display is, in the case of the Lab, a virtual horizontal

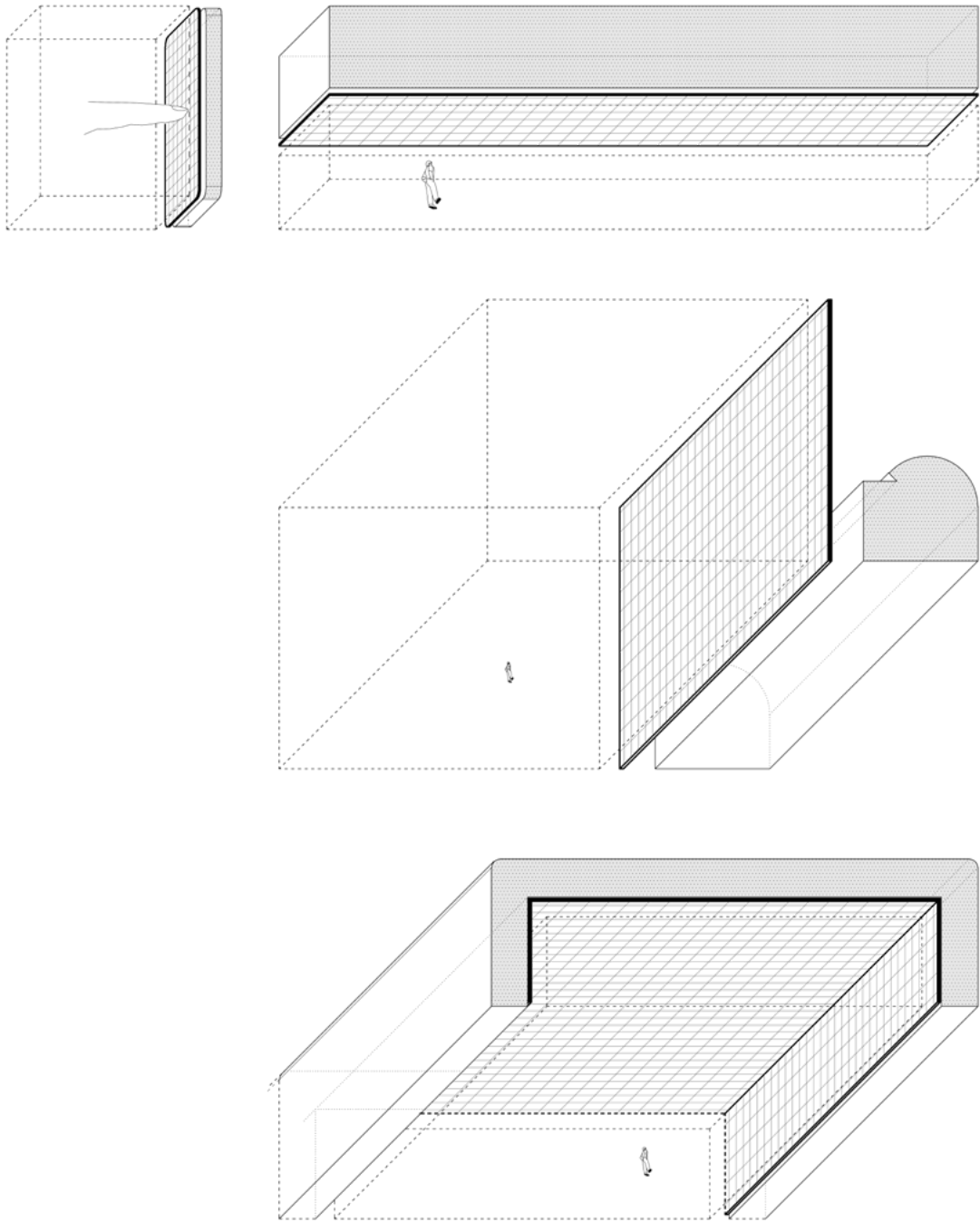


Fig. 1: From top to bottom: *hardware*, *interface* and *space of interaction* of the smartphone, of the BMW Guggenheim Lab, of the Football Hall of Fame Museum and of the Sainsbury Centre for Visual Arts. Drawing: Author.

limit made of lights, screens and audio speakers at user's disposal. Interacting with it is simple and intuitive. As in a smartphone, where a user-friendly interface based on touch-screen technology and natural gestures, immediately reveal its working logic, this 'travelling box' helps the understanding of the space. As well as a device, a building could be designed for the user, making its aesthetic quality an integral part of its utility.

Space of Interaction

The BMW Guggenheim Lab is customisable and suitable to multitasking. [Fig. 2] It is a work-in-progress playground, easily configurable, where everyone creates their own experience. The user is like a child who can personalise his or her environment, like installing additional apps. The project must be neutral and leave room for the user to express himself as Atelier Bow-Wow stated during the New York presentation:

Rather than architects educating the public on how to behave within spaces, it is the public who should have the autonomy of spatial practice in their cities ... We have always been advocates of people regaining ownership in order to shape the city around them ... We always conceived the Lab as a public space without enclosure.⁷

The space they are interested in is what Henri Lefebvre calls 'social space'⁸, a space that is self-generated by 'spatial practice':

Space is produced neither by architects nor by city planners, nor by the users who live in space: space is not *consumer*-generated but *space*-generated. In other words, space is media-generated media.⁹

As in the first, the second diagram presents the Lab in relation to the paradigm of the smartphone and to two other case studies: Cedric Price's Fun Palace and OMA's Prada Transformer. The subject

in this case is the floor plan of the space of interaction. The same goal is achieved through an idea of a multitasking space in completely different ways. Price's project builds and demolishes its own space according to needs and using a series of cranes and a highly mechanized technological apparatus. The Transformer has only four pre-built configurations, constructing a radical multifunctional object that, rotating, can rapidly transmute itself into a cinema, a catwalk, an exhibition room, or a place for events.

The Lab goes further: it has everything it needs immediately available in the space above. The space of interaction is a flexible open space, configurable because of the tools contained in the floating 'toolbox'. Like the Fun Palace, Atelier Bow-Wow proposes overlapping sets of the same area defined not so much by the light carbon fibre structure, but by the rhythm of the on-going programmes. Like OMA's temporary pavilion, everything is ready to use and the space can change shape with little effort in a tiny interval of time. The Lab is a space (or screen) where several functions (or apps) can run and coexist: talks, lectures, performances, exhibitions, screenings, workshops, celebratory gatherings, think tanks, public forums, games, special events and city explorations.

Transportability and Connection

The last formal quality may be the most naïve, but unveils an architects' interesting stance on the philosophical concepts of space and time. [Fig. 3] Compactness, transportability, connection and synchronisation are features that deal with the two physical entities on a double semantic level.

The Lab is an autonomous object designed to be dismantled and reassembled in different parts of the world. This travelling pop-up structure was relocated first to Berlin, in Prenzlauer Berg in the Pfefferberg complex, and then to Mumbai, on the grounds of the Byculla museum and to other different satellite

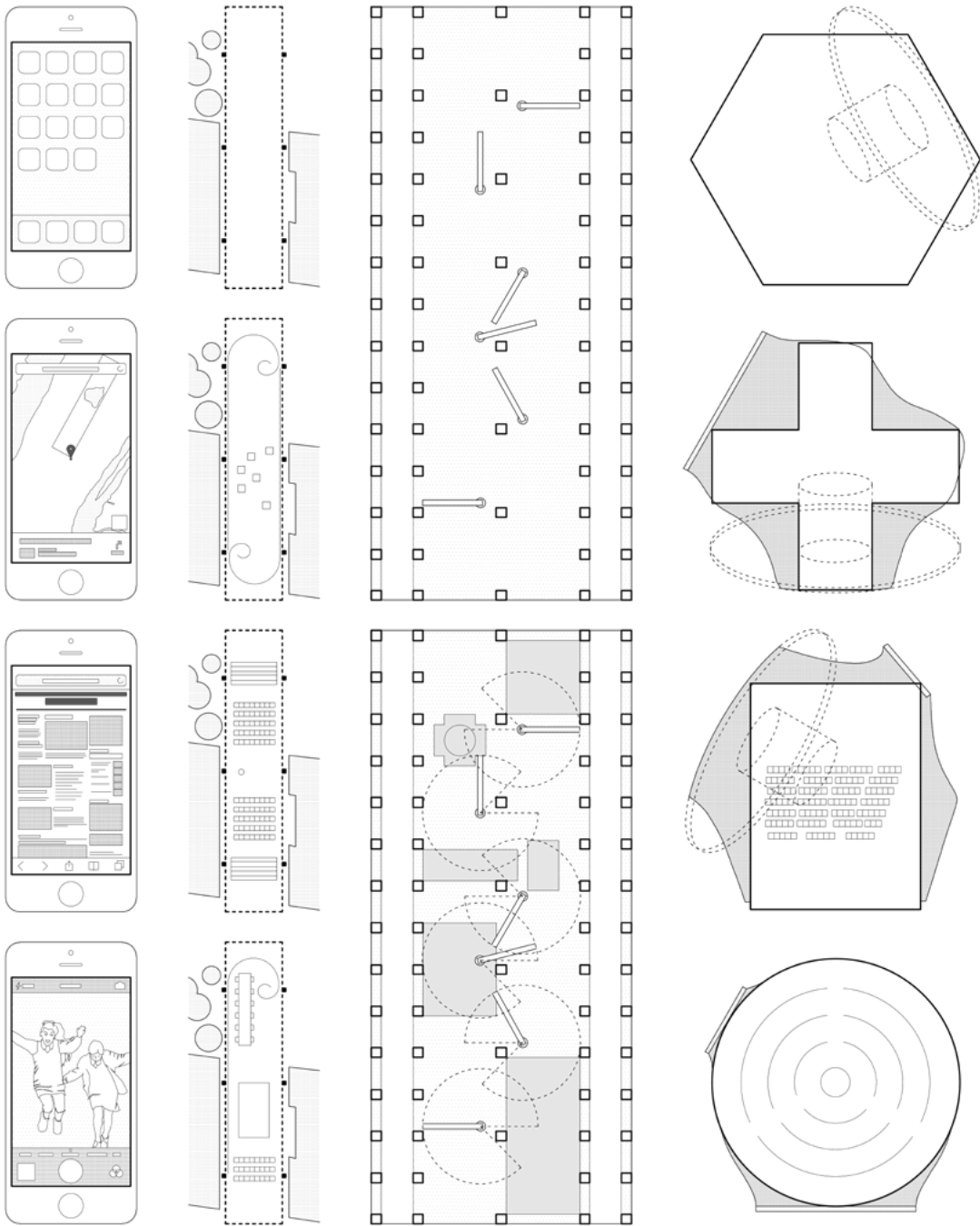


Fig. 2: From left to right: *space of interaction* of the smartphone, of the BMW Guggenheim Lab, of the Fun Palace and of the Prada Transformer. Drawing: Author.

sites throughout the Indian city. Here, together with SDM Architects, Atelier Bow-Wow designed a new, specific, low-cost, bamboo structure deeply linked to the densely populated environment and to the traditional *mandapa*. The abstract space conceived by Atelier Bow-Wow for a generic place is from time to time responsive to the cities it visits. Combining local and global, it could be a solution to the Kenneth Frampton dichotomy of 'place' vs. 'space':

[An] abstract connotation of space [is] opposed to the socially experienced nature of place. ... Place now appears as inimical to our received mental set, not only as architects but also as society. In our ubiquitous "non-place" we congratulate ourselves regularly on our pathological capacity for abstraction; on our commitment to the norms of statistical coordination; on our bondage to the transactional processes of objectification that will admit to neither the luxury nor the necessity of place.¹⁰

As an answer to this opposition, it is interesting to investigate the apparent lack of coherence of Atelier Bow-Wow's house projects. In *Graphic Anatomy*, they note that 'the differences in character are produced by basing the building behaviour on the place for which each house is planned', creating a new kind of building situated 'between architectural typology and urban morphology', that 'do not blindly follow the concrete surrounding environment and the principles of the city that generates it, nor do they disregard these and do something completely unrelated'.¹¹

Travelling around the world, the Lab creates, therefore, real community centres, establishing a public platform for inhabitants to connect and share ideas, but it is also an access point for a virtual net of websites, blogs and social networks. It becomes the neck of a sandglass that unifies a spatially and temporally defined place with an infinite and universal space outside the contingent space-time,

as when a physical device allows the user to access content on the Web or on the cloud storage. This multidisciplinary urban project offers a variety of ways to participate. Members of the public are invited to join the dedicated web-community where notable guest writers and regular interviews with the Lab's collaborators are reported. Interaction is also at the base of the game experience *Urbanology* that, with workshops, experiments, discussions and screenings played on-site, off-site and on the website, permits participants to decide about education, housing, health care, sustainability, infrastructure, and mobility of their own city.

Against the attitude that looks at the generative process of form as an autonomous entity that follows a strict internal logic and compositional rules, there could still be space for the idea that each age has its myths, produces its will to form, and expresses it in every field. Atelier Bow-Wow opens their *Graphic Anatomy* with an exhortation that reminds us of Le Corbusier's *yeux*. They promote an 'architecture that opens its eyes and strains its ears to this diversity of spatial practice, encouraging and assisting it; this is the rediscovery of architecture itself'.¹²

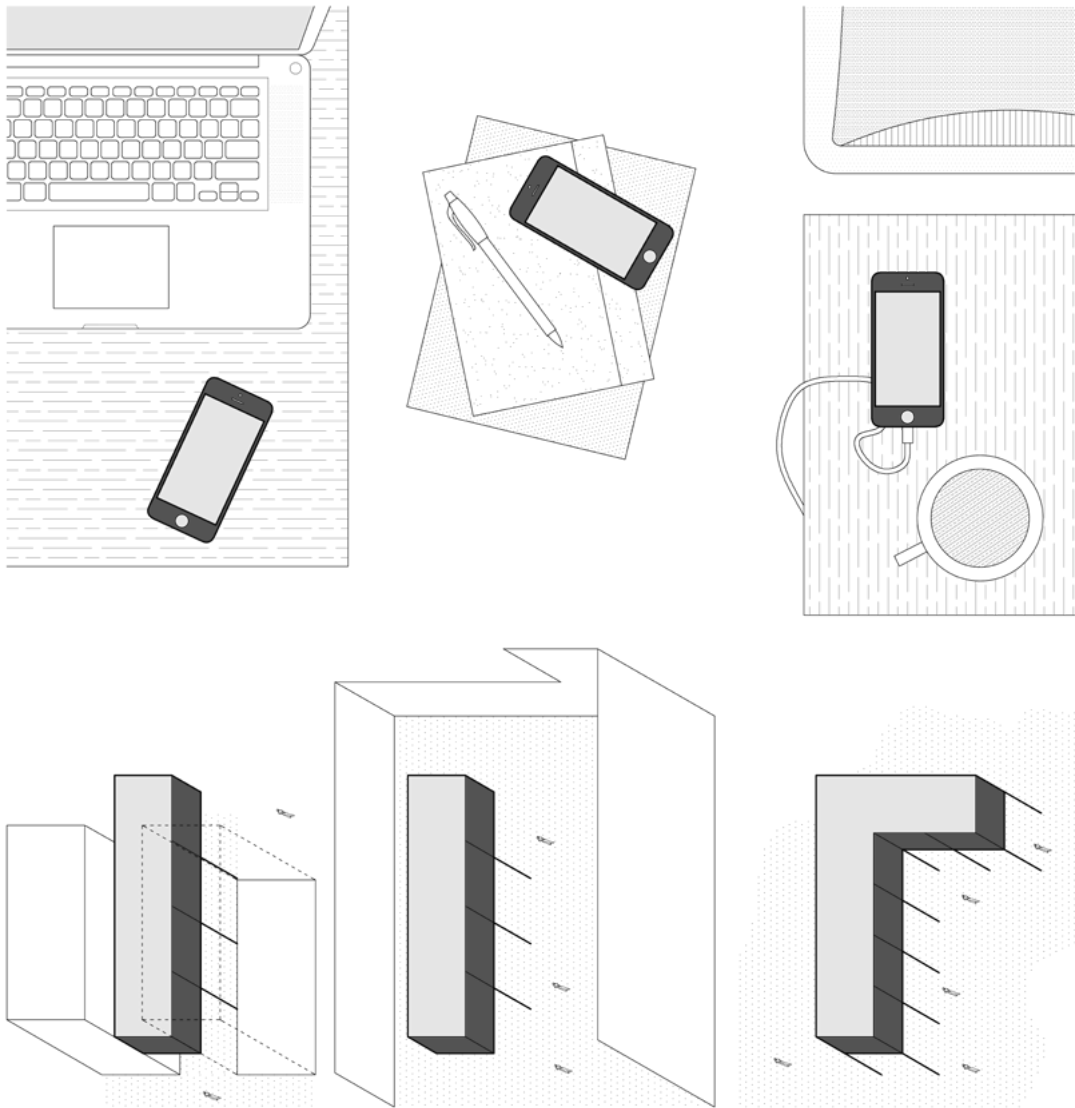


Fig. 3: Above: transportability and connection of a smartphone. Below, from left to right: the BMW Guggenheim Lab in New York, in Berlin and in Mumbai. Drawing: Author.

Notes:

This is a review article of the BMW Guggenheim Lab, designed in 2010 by Atelier Bow-Wow. The pavilion was built in 2011 in Manhattan, New York. Afterwards it has been transported to both Berlin and Mumbai.

1. Le Corbusier, *Towards a New Architecture*, ed. and trans. Frederick Etchells (New York: Dover Publications, 1986 [1923]).
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3. Terunobu Fujimori, 'The Origins of Atelier Bow-Wow's Gaze', in Atelier Bow-Wow, *Behaviorology* (New York: Rizzoli, 2010), 122–29.
4. Atelier Bow-Wow, *Behaviorology*, 8–15.
5. Recurring concept in both Atelier Bow-Wow, *Graphic Anatomy* (Tokyo: TOTO, 2015); and Atelier Bow-Wow, *Behaviorology*.
6. Atelier Bow-Wow, *Graphic Anatomy*, 107–19.
7. Atelier Bow-Wow quoted in Amy Frearson, 'BMW Guggenheim Lab by Atelier Bow-Wow', *Dezeen*, 4 August 2011, <https://www.dezeen.com>.
8. Henri Lefebvre, *The Production of Space*, trans. Donald Nicholson-Smith (Oxford: Basil Blackwell, 1991 [1974]).
9. Meruro Washida, 'Atelier Bow-Wow as Artists: Changes in Art and the Potential of New Social Space', in Atelier Bow-Wow *Behaviorology*, 244–55.
10. Kenneth Frampton, 'On Reading Heidegger', *Oppositions*, no. 4 (1974): 1–4.
11. Atelier Bow-Wow, *Graphic Anatomy*, 107–19.
12. Atelier Bow-Wow, *Graphic Anatomy*, 4–5.

Biography

Luca Di Lorenzo (1987) is a PhD student of the Villard de Honnecourt international doctoral programme in architecture at the Università IUAV di Venezia, in cooperation with the TU Delft, the ENSA de Paris-Belleville and the Universidad de Sevilla. His PhD thesis, *Generation aXo: Modernist Legacy between Abstraction and Ideology*, focuses on the axonometric projection as modernist tool in relation to its anachronistic revival in the 2010s. He is part of the teaching staff of the Architectural Design and Architectural Theory courses at the University of Camerino.

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Footprint is published by Jap Sam Books and the Architecture Theory Chair, Faculty of Architecture and The Built Environment, TU Delft,

PO Box 5043, 2600 GA Delft, The Netherlands
+31 (0)152781830, editors@footprintjournal.org

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**JAPSAM
BOOKS**

ISBN: 978-94-90322-98-4

www.japsambooks.nl

ISSN: 1875-1504

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