

# The Diagrammatic Inquiry of Architectural Media

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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.<sup>1</sup>

The useful icon has a suggestive 'utopian' nature that helps to advance investigation.<sup>2</sup> 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.<sup>3</sup>

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.<sup>4</sup>

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.<sup>5</sup>

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.<sup>6</sup> 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.<sup>7</sup> 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.<sup>8</sup> In other words, it meets the requirements of simplification and manipulability stated earlier.

Philosopher Nelson Goodman distinguishes between different languages of art.<sup>9</sup> 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.<sup>10</sup> 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.<sup>11</sup> 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.<sup>12</sup> 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.<sup>13</sup> 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



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*.<sup>14</sup>

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.<sup>15</sup>

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.<sup>16</sup> 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.<sup>17</sup>

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.<sup>18</sup> 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.<sup>19</sup> 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.<sup>20</sup> 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.<sup>21</sup> 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.<sup>22</sup> 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



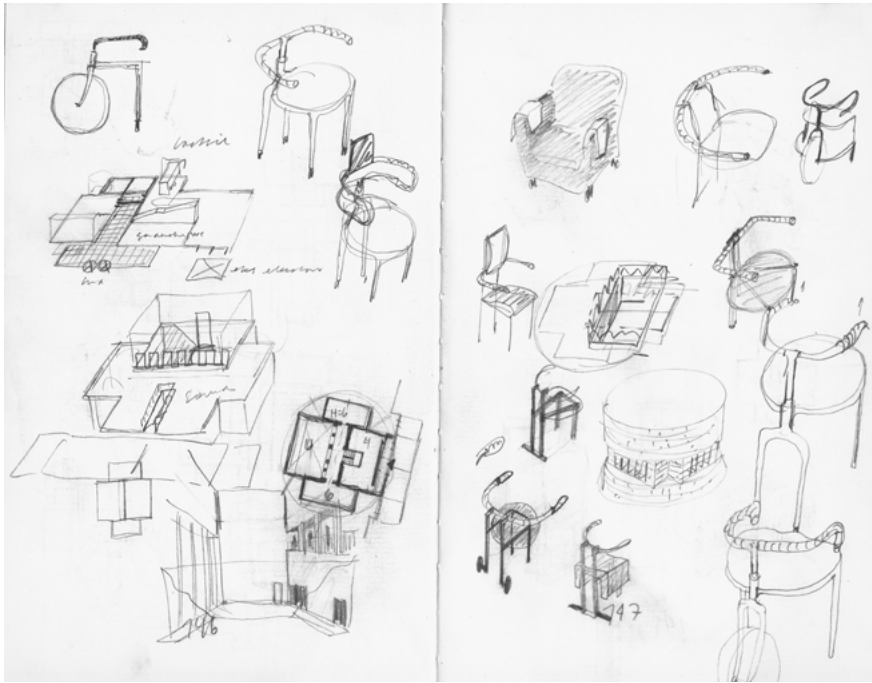


Fig. 3a

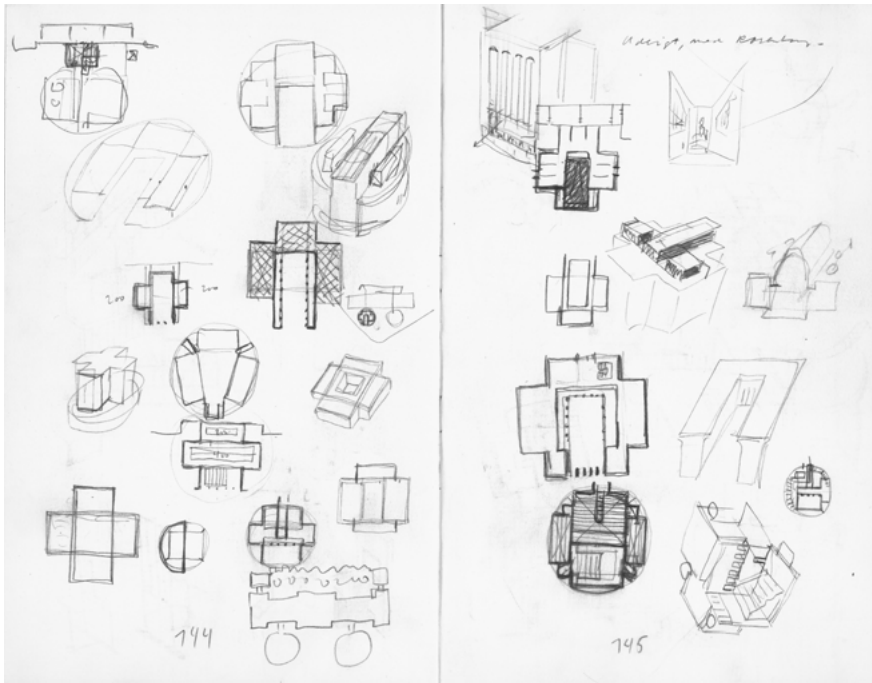


Fig. 3b

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.<sup>23</sup> 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.<sup>24</sup> 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.<sup>25</sup> 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.<sup>26</sup> 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.<sup>28</sup> 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.<sup>28</sup> 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

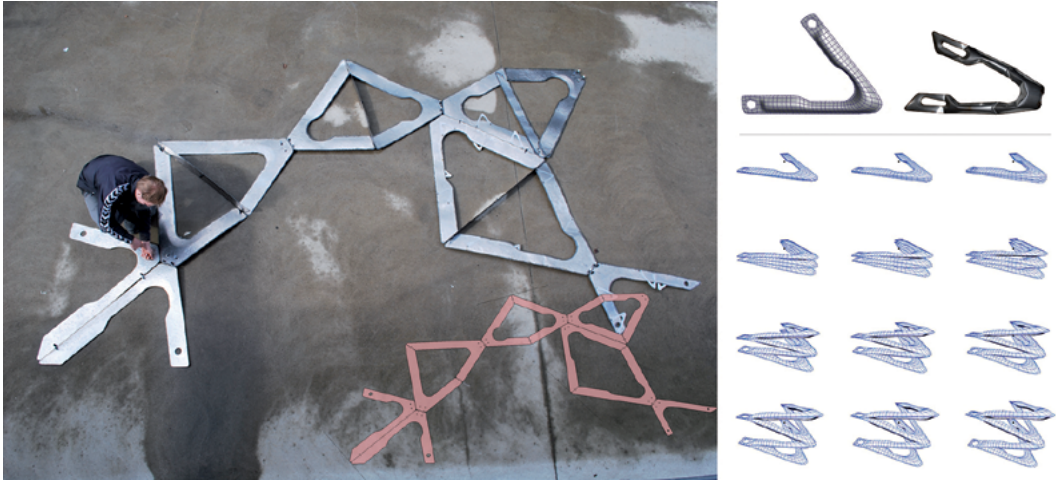


Fig. 4

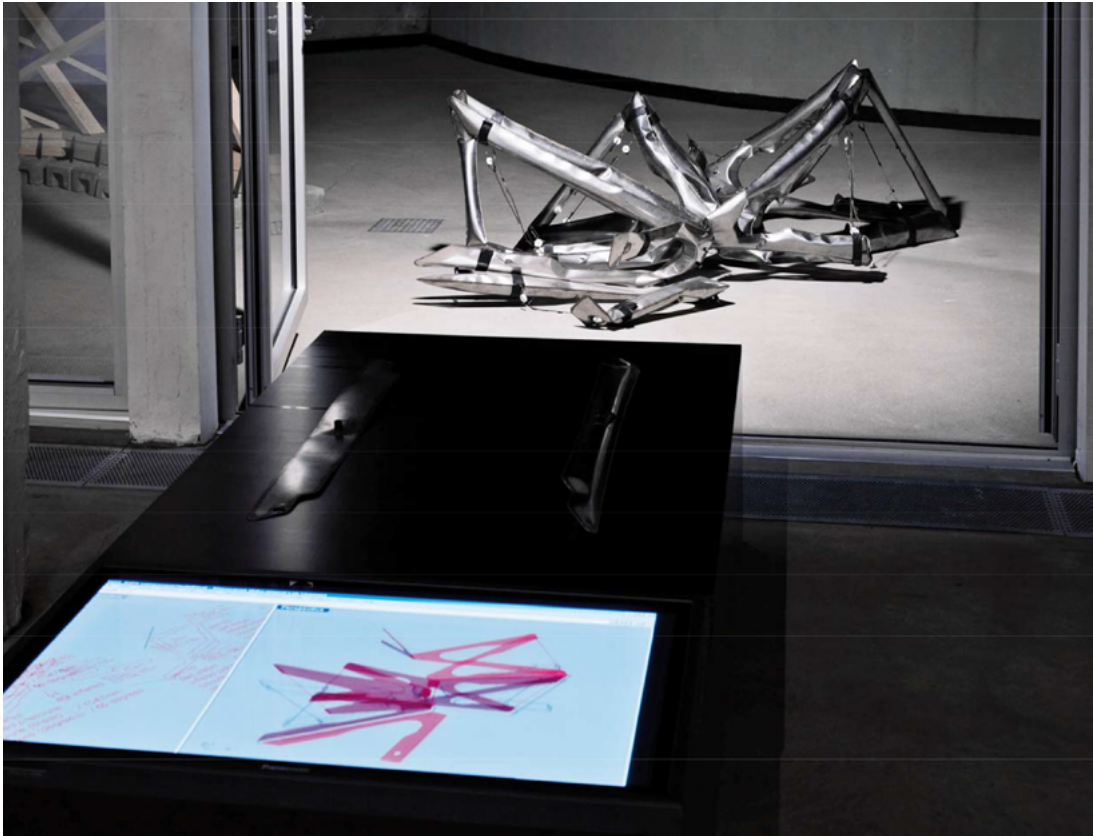


Fig. 5

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.<sup>29</sup> They struggle with the two-dimensional image in order to produce new architectural figures. The architectural practice discussed in this section takes

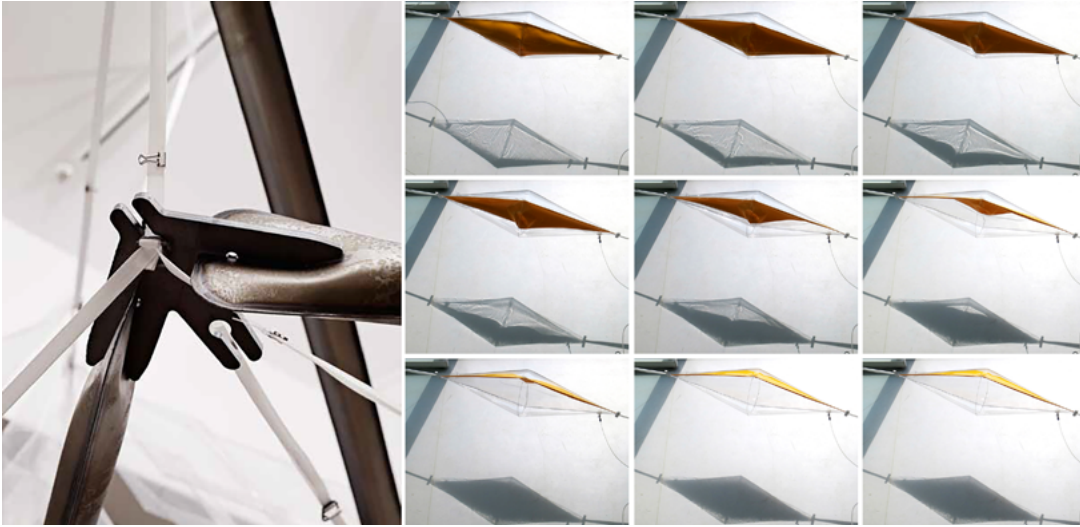


Fig. 6

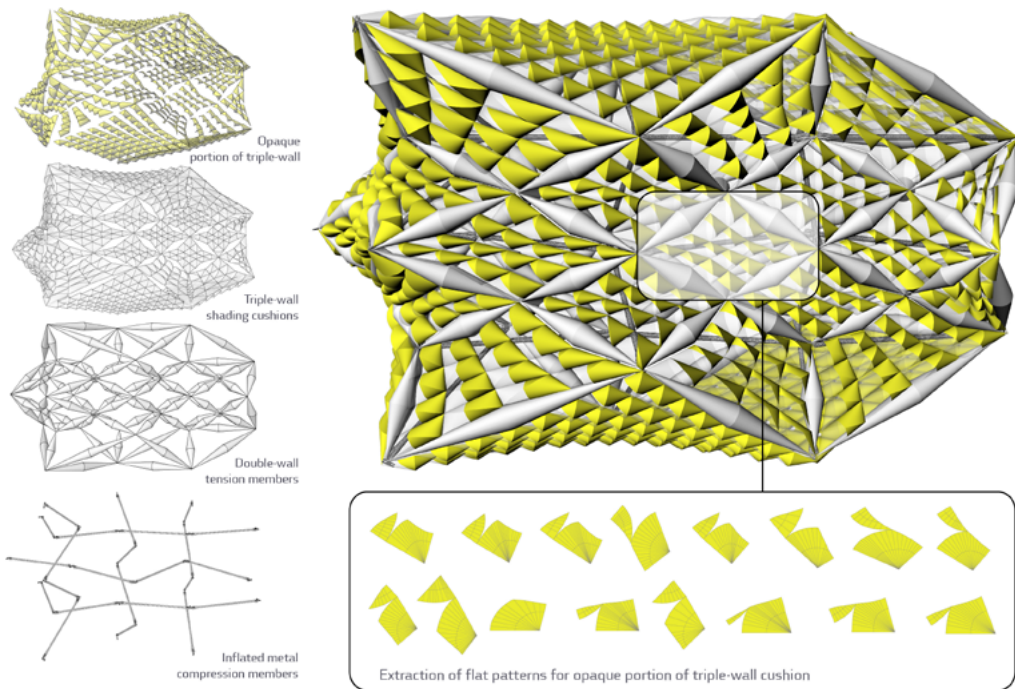


Fig. 7

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.