On Architectural Knowledge

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Cerum is organizing seminars in urban development and urban design. The focus on the urban dimension reflects the need to obtain new knowledge on the design of cities and the smaller municipalities in the urban regions as well as their development and functions - seen separately or in a network.

The aim of the seminars is to create a network of contacts between actors working on the urban arena, e.g. local and regional planners, residential enterprises, building companies and architectural firms. The seminars reflect the research carried out at other universities and university colleges in Sweden with focus on the urban dimension. The seminars are part of an ambition to establish a Centre of Urban Design at the University of Umeå.

Some of the researchers have submitted written documentation of their contributions to the seminars. These contributions are published in Cerum's Working Paper Series. The present paper is written by Lars Marcus, architect and researcher at the Royal Institute of Technology, Stockholm.

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Nils Häggström
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The need for theoretical knowledge in architectural practice

The epistemological field of architecture is not one that is easily comprehended or generally agreed upon, not even by people working within it. On the contrary it is a field where various forms of knowledge meet and where their specific art and relations seldom is investigated. This often leads to dichotomic statements from advocates of different standpoints, let us say between representatives for an artistic or a scientific approach to the subject, for instance. To deepen the understanding of architectural knowledge and its internal entities and relations as to, among other things, reconcile such unproductive conflicts, can in many ways be said to be the theme in the work of Bill Hillier. I will thus in this first part of my paper, heavily relying on the two first chapters of Hilliers ‘Space is the machine’, called ‘What architecture adds to building’ and ‘The need for an analytical theory of architecture’, try to sort out some of these entities and their relations in the epistemological field of architecture.¹ First, as to point out the poignant need for scientific research within architecture, second, as to point to exactly where such knowledge is useful in architectural practice.

The century of architectural building

As the century closes it is possible to look back on what must be regarded as the most tremendous period in the history of mankind. This is the century when man can be said to finally have conquered the world and totally changed the face of the earth. In a way we can say that man in the beginning of this century inherited a natural world, where most of its content was so to say given, but in the passing of time transformed it so that what we now are leaving for future generations, is to a very high degree an artificial world, a world constructed by man. Thus, it is possible that if this century in many respects was the century of natural science, the next will be the century of what Herbert Simon calls the science of the artificial.² We have learned so much about the given natural world in the passing of this century, but as the artificial to an ever growing degree becomes part of that world we also need to learn more about the artificial.

One of the major fields in this science of the artificial, is the field of construction and building. Never before has man built as much as in this century, but the difference is not only one of quantity but also one

¹. Bill Hillier: *Space is the machine*, Cambridge 1996.
of quality. One of the most noticeable features of construction in this century is the degree of architectural building. By architectural building I simply mean a building that is the result of the work and specific competence of architects. In earlier historical periods such buildings have been marginal phenomena, even if very often it is just the architectural building that has become permanent and noticed by posterity. During previous centuries, the majority of buildings have instead been of the type that can be called traditional or popular or, to use a better expression, vernacular buildings. This means a building that is not based on the type of specialist knowledge represented by architects, but knowledge that is part of a more general cultural tradition. The purpose underlying this distinction is not to make a value judgement of the type that architectural building is qualitatively better than vernacular, but rather to make an important observation following Hillier, namely that the different kinds of buildings derive from different types of knowledge.³ It is namely first when we become conscious of this fundamental difference that we can begin to understand what is specific to the building of our epoch and furthermore why this entails special problems.

Another noticeable feature of building during the twentieth century is that for the first time in history, building can be said to have been a failure, naturally not in its entirety, but remarkably often. This may sound like a dismissive remark, but in the following argument I hope to make it less startling. To begin with it is simply difficult to find examples of vernacular building during history that can be alleged to have been a failure. This is virtually a necessary consequence of the very definition of vernacular building, which is a direct spatial answer to local needs and values in the cultural context from which it emerges. Purely technically, there have certainly been flaws that were experienced as problematic, but it is difficult to talk about functional or aesthetic failures in a more fundamental sense. The architectural building of this century, by contrast, has been continuously criticised on both the functional and aesthetic planes, and has even been accused of being a strong contributory cause of many of the social problems shared by the western welfare states. By this I do not wish to make the reverse value statement, that vernacular building is more natural and therefore better than architectural. What I want to do is to draw attention to these facts, as I maintain that it is necessary to take them seriously if we want to develop our knowledge in the science of the artificial when it comes to the special field of construction and building.

The characteristics of architectural building

The reason that architectural building sometimes, but indeed not always, can be said to fail while the vernacular per definition almost never does, is derived from the fact that they emerge from different kinds of knowledge. If we begin by looking more closely at these types

of knowledge, it also becomes possible to arrive at a better understanding of what I mean by failure in this context.

The vernacular building can be described as a type of knowledge that derives from handwork which is slowly developed over generations through the utilisation of a bank of practical knowledge that is transferred from individual to individual through practical expression. Proven solutions with a known outcome are transferred over time with changes being introduced slowly, the practical expression of which is tested so as to be adopted or rejected. This does not mean that developmental leaps dependent on impressions from outside or on internal innovations do not occur, but rather that to an overwhelming extent it is a question of a slow development of knowledge based on proven experience. The development of such knowledge furthermore occurs in a given social and cultural context, which entails a direct reflection of the needs and values established within it. The social order, in this way, receives a physical expression in the spatial order and the opposite, the spatial order supports the social order. We can even say that the spatial order is one of the more important means by which the social order reproduces itself. The close ties between both of these orders in vernacular building enable me to dare to claim that in principle the vernacular building is never a failure, but in its given context is always satisfying. We thus see great similarities between knowledge in the vernacular building which we usually call skills or techné, that is, knowledge of how one does something.

To be reliant on given traditional forms is nevertheless almost a negation of architecture, since architecture to so great a degree is valued on the basis of its capacity for innovation and the formulation of new solutions. Architectural knowledge is expressed almost in the opposite way compared to the vernacular, namely in its capacity to be creative rather than derivative. As Hillier points out, to copy is one of the greatest tabus in architecture — he is not speaking of conscious loans — while it in many cases is exactly what is looked for in the vernacular. At a deeper plane this difference is concerned with a greater consciousness in architectural knowledge with the ideas from which it emerge. We can very well imagine that even architects work through deriving ideas from older types of buildings; the difference being that they are conscious of what they are doing. For them it is thus a question of a conscious choice among various approaches. Such conscious choices between different theoretically possible options are, however, just what does not occur in vernacular building.

This also tells us something about the way that architectural knowledge is transmitted. It differs namely from the vernacular in the way that it is not transmitted through practical experience from individual

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5. Here and in the following I use these concepts of knowledge as used by José Luis Ramírez: Skapande mening (Creative Meaning), (Nordplan Dissertation 13:2), Stockholm 1995, p. 49-110.
to individual, even if this also takes place, but largely with the assistance of theoretically formulated ideas. Underlying practically all greater architectural innovation during the twentieth century are more or less interlinked theories, which function to inspire architectural work to take new directions — even if perhaps the realised constructions related to these theories plays an even greater role. What is typical for such theories or constructions is a lack of ties to a clear social context. On the contrary, what is innovative often consists of transferring and applying ideas from one context to another, or setting parts of different contexts into new wholes. Architectural knowledge is thus based on ideas or theoretically based in a way that we cannot say applies to the vernacular. To put it in Bill Hilliers unhesitating words: 'architecture is theory applied to building'.

This means that architects can be said to work at a theoretical level, that they make innovative choices that do not simply emerge from the cultural context in which they exist or from the practical tradition to which they belong, but that they also borrow from other contexts or develop solutions along new principles. We can thus, in distinction to the vernacular, see how architectural knowledge resembles what we usually call scientific knowledge or *episteme*, that it is not simply knowledge of how one does something, but also of why one does it.

The problem with architectural building

At the same time it is exactly here where the problems arise with a building based on architectural knowledge. It is, as we saw, a form of knowledge that is proficient at generating new spatial orders or setting existing ones into new contexts. Nevertheless, for obvious reasons, there is a lack of an experiential basis for such solutions of the kind that exist in vernacular knowledge. This makes it difficult to predict how the solutions that architects work with will be accepted and function in the social orders in which they are applied. The links between these two orders is thus, in contrast to the situation in the vernacular, very weak. This is the reason I think, that buildings during the twentieth century, which have to such a high degree been of the architectural type, have encountered so many failures. In the social and cultural contexts in which such buildings have been erected, the aesthetic ideals which they represent have often been obscure and their functional solutions directly unsuitable. The strength of architectural knowledge thus lies in its *generative* capacity, while it demonstrates a noticeable weakness in foreseeability or *predictive* capacity.

In vernacular building, the opposite condition tends to apply. As we saw, it avoids predictive problems largely through relying on known solutions with familiar outcomes. The internal development, which nonetheless takes place, is simultaneously characterised by slow and

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small steps, so that what is new and its outcome can be tested by degrees and become known. However, vernacular knowledge has difficulties in being generative, or in renewing and developing itself in a more radical sense and often has conservative features. As we saw, it relies on knowledge that in principle is unconscious of its theoretical base and thus has difficulties in discovering alternative possibilities and ways of relating. Knowledge in the vernacular building thus, in direct contrast to architectural knowledge, has its strength in its predictive capacity and its weakness in the generative.

It is, however, important to recognise that these lines describe general conditions. There is a more quiet development of knowledge, like that in the vernacular, even in architectural building, just as developmental leaps occur in the vernacular and not only in the architectural. My intention in this discourse is to point to the general differences though, not to describe the nuances.

The need of theory for architectural building

Something which architectural knowledge appears to lack is thus better knowledge, or even a theory, of the relations between spatial orders and social orders. This may appear to be surprising with regard to Hillier’s statement, that what distinguishes architectural knowledge is precisely its theoretical approach. Yet theory can imply many things; there is thus reason to look more closely at what is meant by theory in this context.

Hillier distinguishes between two types of theory within architecture, which in addition are closely linked to two elements of what architects actually do and are expected to be good at, two elements which we further have already touched on. We can with an explanatory simplification say that architects in design processes primarily do two things, on the one hand they derive architectural solutions — the generative phase — and on the other they make predictions about the outcomes of these solutions — the predictive phase. In practical work a continuous interaction naturally takes place between these elements. What is important is to see that architects need theoretical support in both these elements, but above all that the theory in both cases must be of different types. In the first case, it is theory that helps architects to see how the architectural solutions they are working with can be developed, renewed, put together in another way or be replaced by new ones. Such theories can be characterised as speculative theories in a positive sense, that is theories that attempt to see the assumptions in a new way — or theories of possibility as Hillier puts it. Such theories we know amongst other things from art, where the various manifests of modernism are good examples.

Yet architects also need theories to help them with the other elements, namely the predictable outcome of the architectural forms and

solutions which they suggest. To make such predictions, there are only two ways to take, either to refer to previous examples, or to refer to some principle. Here we can see the strengths of vernacular buildings: they can always follow the first path and refer to earlier examples within the building tradition to which they belong. In principle, the outcomes of the solutions which are used are always known. Within architecture this is impossible as one generally wants to create exactly that which one has not seen before. Nevertheless, to a great degree, architectural work also refers to previous examples, but this is problematic since it is only possible in relation to details which can be checked and transferred from one situation to another. Architectural buildings as a whole are per definition virtually unique, especially if we weigh in the fact that they are often executed in very varied contexts. This means that as soon as we come to situations that are a little more complex, it is difficult to refer to earlier examples since they simply do not exist. What remains is to refer to a principle, that is to say, to some form of architectural theory.

**Traditional architectural theory**

Hillier further points to the fact that if we look more closely at what is generally called architectural theory, we shall see that it predominantly consists of theories which are intended to be supportive during both processes described above, but which above all have had success in the generative phase while having serious problems in the predictive. This is because architectural theory such as we know it from Alberti to Koolhaas has generally been of a speculative type, which as we have seen can provide support particularly in the generative phase of the architects’ work. Yet speculative theories cannot be a support in the predictive phase since we are no longer interested in how something might be, but want to know how something actually is or will become. This phase in the work of the architect quite simply needs the support of theory in a more rigorous sense, namely scientifically based or analytical theory. Such analytical architectural theory is, however, unusual and has often come to be replaced by speculative theory extended beyond its limits. We can thus say that architectural knowledge often acquires a pseudo-epistemic character, which means that it tries to explain why something is done, but on the whole does this on shaky grounds.

To exemplify somewhat, we can take Louis Sullivan’s sentence *form follows function* as an example of a compressed type of theory that has had great significance for architectural building during the twentieth century. This sentence is of a clearly speculative type, as it helps us to look at architectural form in a special way. This makes it a theory that can provide very sound support to an architect who is concerned with

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generating ideas for suitable forms for an architectural problem; as such it has also been particularly fruitful. However, it has very little to tell us when it comes to predicting the outcome of these forms even if this sentence can beguile us into believing that a function almost automatically leads to a relevant form, and that this form in turn leads to the desired function. This, however, would be to stretch the theory beyond its carrying capacity. Should this occur, its limits in these respects are revealed.

To take an example from the world of artefacts, we can see how the idea of differentiating between the functions of walls into two systems: on the one hand bearing and on the other spatially dividing — in the form of pillared decks and light walls — has been a particularly fruitful idea that has facilitated freer forms and new opportunities emerging within the building trade during the twentieth century. Yet to link this idea with predictability of the outcome, namely that such a separation in some way will lead to greater flexibility, which is often maintained, is something that experience has shown to be considerably more problematic. Such potential flexibility has seldom acquired the significance for which one had hoped. We face once again a speculative idea, which in a generative respect has been very successful, but which in a predictive respect has created both misunderstanding and mistakes.

In a predictive respect, traditional architectural theory has thus generally been weak and has not managed to provide suitable support. With the lack of both previous examples to be embedded in and reliable theory, it is just in the predictive respect that architectural building can more specifically be said to have failed.

The relation of theoretical knowledge to the architect’s experiential knowledge

Despite the obvious lack of knowledge in this regard, there is considerable scepticism, not least among architects, querying whether the building up of such knowledge and theory development is possible or even desirable. That such a build-up does not seem to be possible, may quite simply depend on our seeing so little of a successful theory; that it is not desired, may depend on it appearing as though the intention behind such theoretical development would be to replace the architect’s creative work with researched norms and algorithms. This is, however, a naive perception and again involves the confusion of different kinds of knowledge. Scientific knowledge always speaks at the level of principles or how something relates in general, while the architect’s knowledge is, to a great degree, experiential knowledge, which identifies what to do in a specific case. Here we are talking of a third form of knowledge then, namely discernment or frônesis, that entails knowledge which does not deal so much with how or why one does something, but rather when one should do it.16

This means that no kind of knowledge can be replaced by any of the others, on the contrary, they are remarkably dependent on each other.

Though each individual case is unique, this does not mean that in these cases knowledge of a more general kind cannot be applied. At the same time, general knowledge cannot show us how it should be applied in the individual case. In practice, architects always work at both these levels, as what they actually do is to apply generally applicable knowledge in a specific form in the individual case; the relevant question being how well-founded the general or theoretical knowledge actually is. Scientific knowledge thus provides support in the form of principles of knowledge when one's own experience of earlier examples no longer suffices to give the requisite answers. Responsibility for how such knowledge is applied in the individual case rests with the architect and as always, it is exactly here where his/her skills are revealed.

The development of scientifically based knowledge and theory building concerning the predictive phase in architectural work is thus, not least against the background of the many failures of this century, a necessity to be able to promote the architects’ competence in the future. Such a development ought in no way to hamper the creative freedom of the architect, but only to define the field of what is possible, that is, to give the architect's creativity precision and strength.
The need for descriptive methods in architectural research

The methodological field of architectural research is one rich in kinds, something more or less inherent in the art of the subject. The built environment plays a fundamental role in many areas of human activity and thus also becomes part of research within these areas. Still, when we turn to the specific study of the built environment per se, one encounters a field surprisingly empty on specific methods of research, especially if we turn to the architectural artefacts themselves. With my own thesis-work as a starting point I want, in this second part of my paper, point to some of the problems this poses. Above all as to point to the need for more powerful descriptive methods in architectural research. In this I am once again heavily relying on the first three chapters of Bill Hilliers ‘Space is the machine’.17

Background to my thesis-work

My thesis work results from questions about the city and its construction which I began to formulate during my architectural studies in the 1980s. At the time there was a newly aroused interest in traditional ways of building cities, that is in the type of construction we can somewhat simplistically describe as the building of streets and blocks with relatively well-defined urban space, such as that which preceded the modern movement. The latter we can similarly describe as the construction of a more open urban space with freestanding buildings. This new interest can be said to have arisen as a result of the strong criticism that was directed at modernistic urban construction in the late 1960s and early 1970s in Sweden. Subsequently this new direction of interests found expression in urban development projects that clearly differed from substantial parts of modernism and instead evidenced influence from older urban building styles.

With these changes, we can say that a fairly generally conceptualised picture of urban development during the twentieth century was established. This we can briefly describe as follows: at the beginning of the century a tradition of urban building existed with roots going far back in time. Among other things it was expressed in the building of cities having streets and blocks with clearly defined urban space — even if throughout history one could identify different characteristic styles in this urban space. It was replaced, after a break in the years right before 1930, by modernistic urban building, which among other things was ex-

pressed through a dispersed urban space with free-standing buildings - even these could nevertheless be said to be composed on the basis of the shifting stylistic ideals that reflected the times. Such modernistic urban building was in turn replaced, after a new break right before 1980, by urban building that clearly derives from the traditional, among other things in that it once again sets great value on a clearly defined urban space — though the forms may vary relatively freely depending on the different historical examples used in the individual projects. On the basis of this historical description, it seems as though we are dealing with two types of urban building: a traditional and a modernistic, where the latter spans an interval of about fifty years, after which we again return to traditional urban building, even if in particular ways it then differs from the earlier models.18

It was among other things this picture, here quite sketchily reproduced, of clearly identifiable categories of urban building, which was linked to different qualities and which replaced one another according to this historical account, that raised a number of issues and objections among several of my colleagues on the course and myself — as it did among many others interested in urban building at this time: In which sense did the new urban building projects resemble traditional urban building; were not the differences despite everything greater than the similarities? Thus criticism of this new urban building came to be formulated — which often was called 'town-like'19 in contrast to the traditional as well as to modernism — but it was a criticism that above all acted as if new urban building was not what it was said to be, namely a

![Traditional city: Östermalm, Stockholm (Stockholms byggnadsordning, 1997)](image1)

![Modernistic city: Traneberg, Stockholm (Stockholms byggnadsordning, 1997)](image2)

18. This historical description, which clearly marginalises modernism, can be said to replace the modernistic historical account, based on the struggle against the miserable urban environments that mushroomed because of industrialisation and urbanisation in traditional cities during the nineteenth century. The various utopian model projects that arose in England and France at the same time form the starting point of a development which step by step led to a breakthrough for modernistic urban building. Here modernistic urban building thus becomes the pinnacle of development rather than a parenthesis.

19. With the term 'town-like' I am hoping to capture what in swedish is called 'stads-mässigt'. That is, a kind of urban building easiest described as being in the vein of the Krier brothers.
revival of the traditional urban building and its qualities, and not so much as if the intention as such were at fault. We can thus say that the criticism was not concerned with whether one should strive for the one or the other, but was clearly deeper; as it acted as if there was an obvious lack of knowledge of how to achieve the one or the other. Subsequently one can characterise the criticism as a criticism of knowledge rather than ideological criticism.

The theses of my thesis-work

It is obvious that the above criticism includes a questioning of the categorisation in which the historical account above implicitly divides urban building, namely into traditionalism and modernism; in particular if we add to traditional urban building the concept ‘town-like’, as the latter, according to this criticism, contradicts the former on most points. If we in accordance with this criticism also do not regard 1930 and 1980 as the important breaking points in the development of urban building, it thus seems as though modernistic urban building cannot be in a category of its own, but rather becomes part of a different and larger one. This is a category I further believe replaces traditional urban building around 1900, when urban planning and design became the subject of architectural knowledge to a degree not encountered before. The point of departure for my thesis-work can thus be said to be an attempt to with a deeper analysis capture this category of urban design that has prevailed through the 20th century.

Obviously such a category must be found on a most fundamental level since it is easy to recognise a great variety in urban form during the last century. My hypothesis is that even so, when analysed in their deep structure they all are very alike. Whether this is true or not is not the subject of this article though, but to point to the procedure for such an investigation, and its general implications for architectural research.

20. The question of architectural knowledge is central in my thesis-work.
Even though my thesis-work thus springs from a critique of city-planning in the 20th century, the task is not to argue against it but to try to distinguish it as a distinct category of its own. This implies that we need to be absolutely clear about what we mean with such a category. It is not difficult to see that there often is confusion between what we may call spatial phenomena and social phenomena. On the one hand, we refer to the built forms and spatial groupings or the spatial dimension of urban building, and on the other, we refer to the experience of and the impact on behaviour of the same urban building or its social dimensions. If we talk about different categories of urban building in a more serious way, we have to deal with categories which encompass both of these dimensions, that is, categories of spatial forms which produce or form the basis for recognisable social qualities.

Here it is necessary to be more precise. What we called the social dimension appears to encompass a great deal; from personal experiences like the enjoyment of a well-proportioned building on a site, to social patterns like the establishment of certain types of enterprise along a particular street. To limit the extent of this dimension and pose the questions more precisely, we can make a fruitful distinction between two aspects of people, which we may say gives birth to different aspects of the surrounding reality. On the one hand, a human being is a physical body, which exists and moves in the surrounding reality, which in this case appears as though it is built up of physical objects and spatial qualities. On the other hand, a human being has a mental consciousness that interprets and understands, indeed, the same reality as previously, but which now tends to appear as signals and meaning bearing forms. On the basis of such a distinction, we can say that the first aspect gives birth to functionality in the surrounding reality while the latter gives meaning to it. If we then are above all interested in that part of the surrounding reality that we call the built environment, we have thus established two relationships, partly a relationship between built form and function and partly a relationship between built form and meaning.\(^{21}\)

With these as points of departure, we can make the questions in my thesis more precise and say that they only, or mainly, encompass relations between built form and function, while, to a great degree, relationships between form and meaning are bypassed. It is nevertheless clear, that both these dimensions in reality are very close to one another, since people of necessity exist in both. Equally, this distinction is fruitful if we want to develop knowledge about the built environment, as it distinguishes between questions that can advantageously be studied from different angles of approach. The reason for this is that weaker links exist in the relationship between form and meaning than in the relationship between form and function, as our bodies create more tangible and observable limitations in relation to the surrounding reality than our consciousness does. In practice, this means that it is necessary

\(^{21}\) Of course one can say that also meaning is a function of the built environment. Here I use function in the traditional sense within architectural theory though, meaning the use or the purpose of the built.
to utilise different methods to study the two relationships; the relations between form and meaning are above all open to various hermeneutic approaches, while the relations between form and function can better be studied on the basis of positivism, if we accept these broad divisions for the moment.

What I am looking for then is not only to distinguish urban planning and design in the 20th century as a spatial category of its own, but also to tie certain functional outcomes to this category. My general thesis can thus be divided into two. Thesis I: There is within urban planning and design in the 20th century a category possible to distinguish as architectural urbanism as opposed to traditional urbanity. Thesis II: There are spatial preferences within aforementioned category possible to tie to certain functional performances.

The architectural artefacts as the specific object of architectural research

In my first thesis, dealing with how, urban planning and design during the twentieth century can be seen as being a category of its own, it appears as though there is a need to study the theories and ideas of urban design. As to be able to see whether it is reasonable to maintain that urban design during the twentieth century is characterised by different considerations at a theoretical level. The second thesis, however, deal with whether tangible connections exist between the spatial preferences of this category and specific functional outcomes. Here it appears as though I need to study the architectural artefacts themselves, to be able firstly to differentiate and demonstrate a consistent presence of spatial preferences, and secondly to tie such preferences to characteristic performances.

Taking these questions in turn, I would deal with the two main objects of study in architectural research, firstly, architectural ideas, and secondly, architectural artefacts. The obvious difference in kind between these phenomena is that in the first case they are made up of language and in the other of things. This makes it clear how a study of them also assumes the adoption of different methods. With regard to the analysis and study of texts, well-developed methods exist among others in the historical sciences, which mean that when the study of these architectural texts is at the centre, it is relatively unproblematic methodologically. If we want to place architectural artefacts in the centre, however, we soon come across difficulties. Methods of studying buildings and urban environments, as the spatial artefacts they basically are, is surprisingly undeveloped. In terms of my own work, this becomes even more problematic as I believe that even in my first thesis I cannot, in principle, use texts, but that here one is again primarily dependent on artefacts from urban building.

For two reasons: Firstly, since the category which I am interested in distinguishing is found at such a deep structural level, there is no reason to believe, not even in a derivative sense, that it is theoretically formulated. Even if this was the case, secondly, it would be problematic to rely
on such documents, since the link between the world of ideas and that of things is extremely opaque. Even if we could find many theoretically formulated intentions underlying a given building, this does not entail a binding connection which enables one to identify them in the building as such.

Let me take the well-known example of Le Corbusier’s five points for a new approach to architecture: the raising of the building on *pilotis*, the deck borne on pillars, the open plan layout, the band of windows and the roof terrace. This is a very clear generative programme, and it is easy to find examples of its influence in Le Corbusier’s production. That is, it is easy to find the above-mentioned form aspects of the programme. However, many functional intentions were tied in to motivate these forms. The reason for raising the building from the ground with the help of pillars for example, was to free the ground for other uses. Yet the areas exposed in this way have seldom been meaningfully utilised. This is but one example of how written intentions are quite far from realised facts.

If we follow a more traditional path within architectural research and try to understand the artefacts via ideas, we thus open ourselves to the clear risk of landing in a self-referring circle, where ideas make us aware of those aspects of artefacts which in turn confirm the ideas. If, however, we take the opposite path and start with the artefacts, in order to try to differentiate the contours of recurring ideas, we can escape such self-referral and indeed discover something new. We can, for example, distinguish between repeated patterns and attitudes in Le Corbusier’s *oeuvre*, which reveal something he himself has not already told us, or perhaps even knew. We may, for example, show that there may have been aspects of form other than those he himself preferred to point out, which might have had a decisive influence on the function of his buildings, or that the forms which he chose to emphasise had a different effect than the one he thought or promised us.

This shows how my two theses in principle become one and the same. By distinguishing spatial preferences in urban planning and design during the twentieth century, which in turn can be tied to characteristic functional outcomes that differ from spatial preferences tied to functional outcomes in earlier urban design, it is possible to maintain that there is something which is spatially characteristic in urban design during the twentieth century and thus even to talk as if it forms a category of its own.

Quantitative methods as a scientific approach to the relationship form–function

What I am facing is thus the almost classical set of questions within architectural theory of the relation between form and function, which at the same time is an example of the more all-embracing connection between spatial orders and social orders. What we have here is a relationship of cause and effect where the built form is the cause and the functional outcome is the effect. Since our objectives are clearly
instrumental—we want to explain exactly what causes certain effects, so that we can develop tools possible to implement in future practice—the firmer we can tie effects to causes the better. While the meaning of architectural form will prove most difficult to translate into such rigorous cause-effect systems, something hardly neither desirable, and therefore calls for methods of understanding rather than methods of explanation, the functional performance of architectural form is preferably handled within such an approach.

The course of action here is once again to try to tie the sphere of the tangible world to the sphere of ideas and language. As I argued earlier these are spheres whose relation is most opaque, in that it is most difficult to translate the phenomenon in the tangible world into language in a scientifically consistent way. Now, this above all concerns what we call natural languages such as English and Swedish. In the natural sciences with their highly instrumental approach one therefore heavily relies on other languages such as mathematical language, since this is a type of language that is much easier to tie to the tangible world, hence the great achievements of the natural sciences. This is simply so because natural languages focuses on individuated descriptions of the world, while mathematical languages focuses on abstract descriptions of the world.

As Hillier and Hanson points out, the lexicon of a natural language simply is much larger than the lexicon of mathematical language.23 Thus, describing the speed of a car mathematically, saying that its speed is 80 km/h for instance, is a very abstract description. On the other hand, because it is so reductive, it is able to capture something of principal importance in the tangible world, rather than of individual importance. Thus, it can form the basis of theory, since theory is concerned with the principles of the tangible world rather than the actual experience of it. For example it can form the basis for a calculation on when this car will arrive at a certain place. Thus we see the great advantages of phenomenon possible to quantify when the purpose is instrumental.

When it comes to the relationship between form and function, what we need to study, to put it a bit simplistic, is basically two parallel quantified descriptions, on the one hand of the spatial form and on the other of the functional outcome, to see if we can discover any meaningful correlation between them. If we do, then there are grounds for maintaining that there is something in the form that leads to the functional outcome, in such a way that a change in the former is likely to entail a change of the latter. Demonstration of such a correlation would quite simply mean that we have discovered a link between form and function.

When it comes to descriptions of the functional outcome, there are large quantities of statistical data available, at the same time as a range of proven methods of observation have been developed within the behavioural and social sciences. The functional side of my investigation is thus methodologically relatively unproblematic. What is difficult, how-

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22. This obviously is a simplified description, which is discussed at quite some length in my thesiswork.
ever, is to find methods with which, in a consistent and preferably quantifiable way, I can describe architectural artefacts.

Configuration as a specific paradigm of architectural research

Now it is not so that architectural artefacts were not previously objects of descriptions. On the contrary, there are many examples of such, from modernism’s studies of measurements to post-modernism’s typologies. The dearth of results which can shed light on the relationship between spatial form and functional outcome, seems to bear witness that these were not sufficiently apposite in this context. One reason for earlier descriptions not achieving constructive results, may be that all such descriptions presuppose that we first have a fruitful paradigmatic understanding of our object of study. This requires an all-embracing theory of the general character of the object we wish to study, so that we do not lose ourselves in empirical reality’s riches and possible observations. As Hillier points out we can then see how earlier descriptions of architectural objects have their grounds in paradigms that have been metaphorically borrowed from other disciplines.\(^2\)

A brief history can shed light on this. During functionalism the paradigm through which we understood architecture can be said to be the machine, that is a paradigm borrowed from engineering. This paradigm has its points if we keep to general discussions of architecture, but is not fruitful when it comes to actual research on the relationship between form and function, as it quite simply does not succeed in capturing the character of architectural artefacts in this context. Buildings simply do not treat their materials, which here must be understood as people and their activities, in the mechanically direct way that machines do. The closest one can come to a description of such relations with this paradigm, was also through translating people’s activities into things, in general in the form of furniture, and to let these be surrounded/or treated by built form—the ‘Frankfurter küche’ is a good example of an

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approach following such a paradigm—or to describe relations between built form and nature, as in the often cited case of sun-angles.

Since the post-modern breakthrough, *language* has taken over as the hegemonic paradigm within architecture, that is a paradigm borrowed from linguistics. This has its points in a more general architectural discourse. The problem with using it as a research paradigm concerning the relation form-function, is that only to a very small degree do buildings communicate their functions at a conscious plane comparable to language. The closest one has come to a description of this relationship is thus in the relatively few cases where architectural forms manage to signal specific messages to our consciousness, for example, which opening in a building is the main entrance or, through resembling a known type, for example revealing that a building is a school. Examples of such descriptions are the urban form typologies of Rob Krier.25

We can thus see how both these paradigms only manage to capture the marginal, if not uninteresting, aspects of built artefacts concerning the relation form-function. To develop more precise and generally applicable methods of description, we apparently need a paradigm that does not borrow from other disciplines, but is specifically based on architectural artefacts.

What we need is quite simply an *architectural paradigm*. A possible such paradigm is found within the field of study called *configurative studies*, which is a field within architectural research that has developed with the architectural objects and especially their morphology as a starting point. This research tradition, which among other things is characterised by strong mathematical features, originates in England, from where several of its leading figures like Lionel March and Philip Steadman come.26 Bill Hillier and the methods and theories of Space Syntax is an important part of this ‘configurative’ tradition.

Space Syntax as a specific method for architectural research

The advantages and differences of a configurative paradigm can be highlighted with an example borrowed from Lionel March. We can imagine a simplified study where we on the one hand have a square table with a chair on each side and, on the other, repeatedly observe that groups of two people far more often place themselves at the corners rather than sitting opposite one another at the table. What conclusions can we draw from this? If we only have access to the methods of behavioural science, we can only seriously analyse the functional outcome, which shows how people often place themselves at the corners of a table. An interpretation of this suggests itself, which for example says that for various cultural reasons people prefer to sit at corners; perhaps sitting across each other for example is found hostile or too formal. This is however unsatisfactory, considering that we have not seriously analysed the form, that is, the table itself. In context, this requires a relevant description of the table.

Based on a configurative description of such a table we can see that the table offers twice as many opportunities of sitting at the corners as opposite one another. This naturally gives us reason to review previous conclusions. We may now consider that what we found is a connection between form and function, that this was decisive for noting that the observation above was not about different culturally based patterns of behaviour, but about the spatial qualities of the table itself. This need naturally not entail that spatial factors exclude the influence of other factors or that there are other important spatial factors than the purely configurative, but clearly that it would be methodologically incorrect to disregard them.

This is an example of how incorrect we can be if we do not have good methods of descriptions of our architectural artefacts, but it also shows how difficult it can be to develop them. The relationship above, with the square table actually offering twice as many opportunities for


two people to place themselves at the corners rather than opposite each other, is not something we immediately recognise when we look at the table. Yet it holds, even though the example must be regarded as particularly insular and simplified. We realise that many fundamental qualities of our architectural artefacts are hidden from our immediate knowledge. What the configurative description did was exactly to bring these forth. Where we thought we knew everything necessary to know about the spatial situation of the square table, the configurative description coaxed forth properties unknown to us that possibly proved decisive for its functional performance.

What configurative descriptions do, as opposed to traditional architectural descriptions, is that they focus on the relations of the parts in an architectural system, rather than the parts themselves, and even, as Hillier puts it, on the relations among relations in such a system. A good example of the performance of configurations is the syntax in language. Syntax tells us in what relation we should put words as to be intelligible, but it does not tell us what words to use. That is that it focuses on the relation of parts in language but not the parts themselves. It is thus obvious that the same words can produce very different meaning depending on their relation; ‘I am right’ can become ‘am I right’.

Language is most useful as an example of configurations also in another respect. When we speak we are not consciously aware of the syntactic level of language. On the contrary, if we make ourselves aware of this level, speech inevitable becomes impossible. It seems then, as Hillier puts it, that the syntactic level of language forms a set of ‘ideas to think with’, while we speak about something else, that is the ‘ideas we think of’. Thus, we do not even need to be able to formulate what the syntactic rules that govern our speech are, to use them. The configurative level of architecture is ‘non-discursive’ as Hillier says, and this is the reason why it is difficult to capture and talk about. Since this level seems decisive when it comes to the functionality of the built environment, this is also the reason why, according to Hillier, we have seen so little development concerning knowledge of the relation form–function.

What configurative descriptions in architecture captures is exactly this sub-liminal level. By necessity we construct configurative patterns when we build, whether we are aware of it or not. The important thing though, is that it seems to be this configurative level that proves decisive when it comes to the functionality of the built environment. It was not the fact that there was one chair on each side of the square table above that proved important, but the fact that the relation of the four chairs turned out to produce twice as many corner-relations as across-relations. A fact that was not possible to point out in the tangible world, but needed to be coaxed forth by special descriptions. We then realise the problems we encounter when studying complex architectural objects such as buildings and cities. We see here both the need for better descriptions within architectural research and the promising achievements of configurative studies.

Within the tradition of configurative studies Bill Hillier and Space Syntax represents a development of techniques for such descriptions
that has proven most powerful and useful when it comes to concrete architectural research. For the more specific art and use of these techniques I want to refer to the thematic issue of the *Nordic Journal of Architectural Research* on the subject as well as an earlier article of mine in the same journal.²⁸

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