TOOLS OF THE TRADE
Thematic Aspects of Designing

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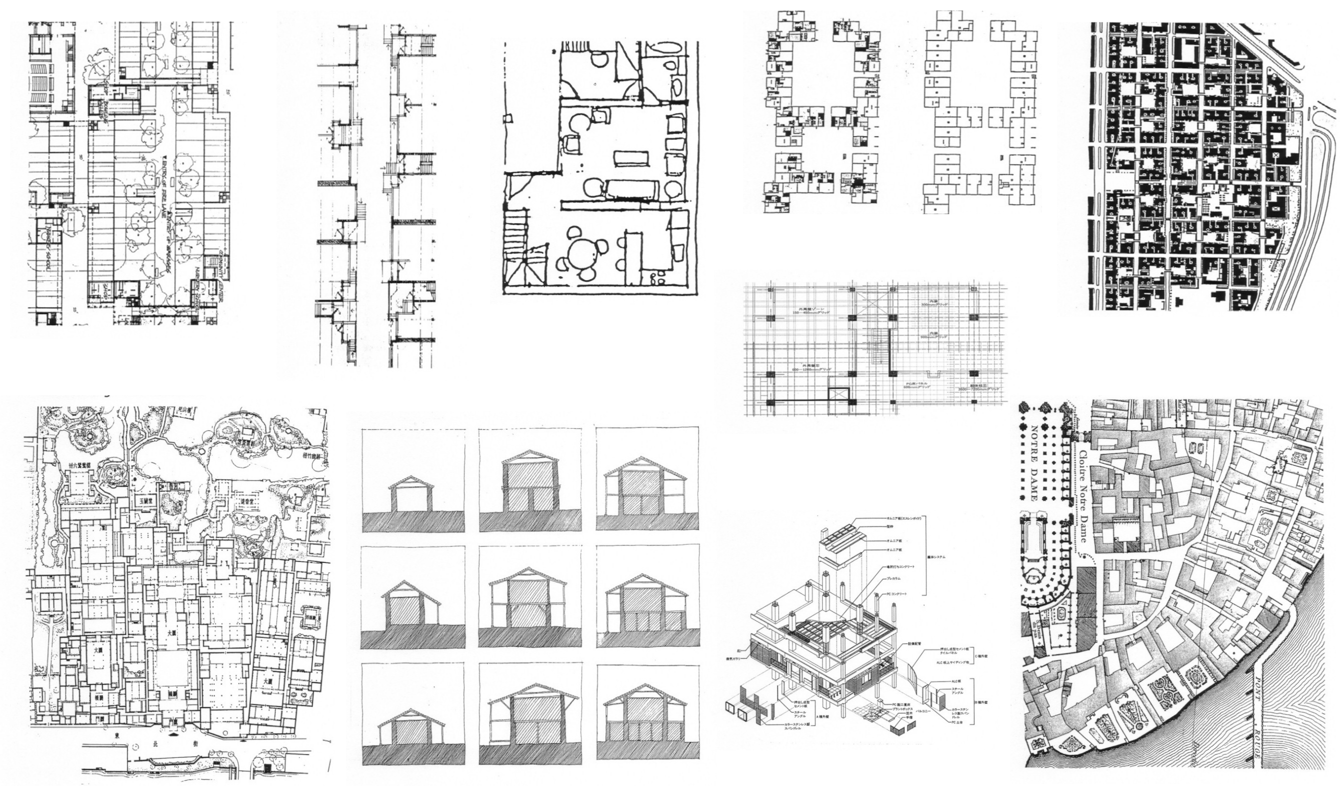

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The Quality of the Common

On various occasions, most recently in a lecture for the Department of Architecture at MIT, I have argued that our profession's avant gardist attitude is at odds with our claim that everything to be built is a legitimate subject for architecture. That claim was first put forward in the heroic days of Modernism and is now generally accepted. Our profession is fully immersed in the everyday environment. This fact implies a new task for architecture, radically different from its historic mission. We have failed, so far, to take the measure of it.

The everyday environment is something continuous, both in time and space. It is also something we have in common: convention is its guide and consensus its mode of operation. These are issues of little value to a profession preoccupied with what is exceptional and new. Hence the new task demands a shift of attitude which does not come easily. The difficulty is not a matter of quality. The conventional can be of very high quality as many extant environments demonstrate. This quality of the common, in fact, is the bench mark against which individual interventions are measured. The merely exceptional and the merely new may fall short of it. The outstanding, of course, must surpass it.

The way we see ourselves as architects determines the knowledge we seek, the methods we apply, and the skills we possess. In what follows I will point out specific instances of method, skill, and knowledge of general value in the making of architecture that nevertheless are not part of our discourse today, nor taught with consistency, because they have to do with the quality of the common.

Less encumbered by real world constraints, our teaching, more so than our practice, reveals our hopes and dreams. It sanctifies and magnifies them. Today's teaching does not see the common as a source of architectural skills, methods, and knowledge, and pays little attention to cooperation and coordination among designers. Hence today's architecture students, who will be designing work places, office buildings, schools, hospitals, shopping malls, airports, apartments and suburban houses, come out less well equipped than they could be.

A rift between our practice and our teaching is often perceived by parties from both sides, who seem to be equally perplexed and irritated by it. Because neither those practicing nor those teaching are in the habit of discussing the quality of the common, the latter will not figure in their dispute. Yet, this negligence may well be the cause of the rift, its symmetry keeping the dialogue off target.

Those among us eager to improve it, too often find that the everyday environment, driven by everyday practice, refuses what we want to contribute. Our expectations are not met, our hopes disappointed, our good intentions not honored. We may be jilted suitors because we do not know the object of our devotion for what it truly is. As long as we ignore how conventions and common values make the everyday environment work, it may elude us, regardless of the sincerity of our attempts and the nobility of our motivations.

In more than a century of upheavals, innovations, and transformations, the wholeness of the built environment has often been declared at risk, a concern easy to sympathize with. Yet this does not justify thinking ourselves designated saviors. The problem is comprehensive. We may well be part of it. Moreover, what is perceived as incoherent may be only unfamiliar. The built environment may be more structured than we think. In any case the everyday world will, eventually, impose its ways on us, rather than the other way around.

Hence our motivation can be selfish. The everyday world may or may not need us, but we need the everyday world, being already dependent on it for the bulk of our efforts. In our single minded pursuit of the special we have forgotten that excellence grows from what is shared and that quality has its roots in common soil. What feeds on its own must eventually atrophy for want of substance. Architecture, no matter how one may define it, cannot afford to ignore where it comes from.

To facilitate saying what I have to say in this report, I will use two words in a special way. They must be explained.

I speak of ‘a field’ to evoke the wholeness of a certain built environment in all its variety and richness of form. A field is both the physical context for, and the subject of our designing. A field is built form as a continuity, known not by its outer boundaries, but by its inner properties.

Properties found in any field may be put in two categories. Some are peculiar and related to a single intervention only. Others are common to the field at large and expressive of the conventions and agreements governing it. Those held in common I will call the ‘thematic’ properties of the field. I call them thematic because they are sustained by actors accepting them as a ‘theme’, making their own variations with them. Any intervention we make reveals qualities derived from both categories. It can be safely said that there is no such thing as a wholly thematic intervention nor a wholly un-thematic one. The most exceptional building will share some thematic aspects with the field it is located in. The most thematic building will have some unique features setting it apart.

In what follows, I discuss ten ways in which the thematic is manifest in the field and connects to our designing. These do not, by any means, exhaust the thematic. Nor are they necessarily the best selection from it. I point them out because they come from my own experience, but I trust most of them, if not all, are familiar to my colleagues. All are a mixture of concepts (ways of seeing the built environment) and method (ways of designing). The two, of course, are mutually dependent. Some of them have already been part of workshops done, at one time or another, by faculty of the MIT Department of Architecture. Others are less familiar. Several were the subject of a course in Thematic Designing I taught in the years before my retirement from MIT. Some I learned about from colleague architects, others from personal experience in research and practice.

On first sight the ten issues may seem disparate. Yet they all belong to the realm of the thematic, a territory largely uncharted, but not necessarily unknown. I offer no map of it but argue it habitable and nourishing and therefore worthy of further exploration. All its features have to do with cooperation and coordination among designers and other decision makers in the field.

My exposition of the ten ways must necessarily remain brief and general. It would be easy to expand on each, but that would defeat the main purpose of this report, which is to argue a link between our neglect of thematics and the weakness of our methods and skills in teaching and practice. I should make it clear, too, that I report on my own experiences and insights and not based on any objective survey. It is hazardous to generalize about the built environment. While I am foolhardy enough to do so nevertheless, I try to reveal the prejudices and experiences my generalizations come from.

I draw lessons from historic environments where fine grained fields of great beauty and richness still can be observed. But I try to pay particular attention to design tasks typical for our times: The large building - institutional, commercial, or residential - and the large project, where urban design and architecture merge. There the everyday environment assumes shapes never seen before, and the need for thematic knowledge and skills is most urgent. Large scale interventions are here to stay and may only become larger in the future. We must accept them as the true challenge they are, but should be capable to make them, inside their large volumes, fine grained and resilient like our historic references.

Nobody builds alone. The very act of building is one of cooperation. Making a design is to communicate what is to be put together by others, for others. There is a limit to innovation. The world cannot be re-invented with every project. When designing, we must deal with what we consider peculiar to the job at hand. All else must necessarily remain in the realm of convention.

Indeed, there is only a profession to the extent that we can formalize a common base of knowledge, method, and skills. We know as much, but do not speak of it. It somehow does not fit in the way we explain ourselves. We must hence explain ourselves anew. We need theories that throw light on the thematic roots of architecture, and a historiography that traces them.

The study of thematic form will liberate us from self imposed limitations that have become counter productive. Knowledge, for instance, is by definition shared. When individual expression is the dominant concern, it will not accrue. Skills must first be appreciated as applied by others. When we are reluctant to borrow, the effort of acquiring them seems excessive. Skills come from methods and methods also are thematic by nature. When we only wish to do our own thing, they easily seem unnecessary constraints.

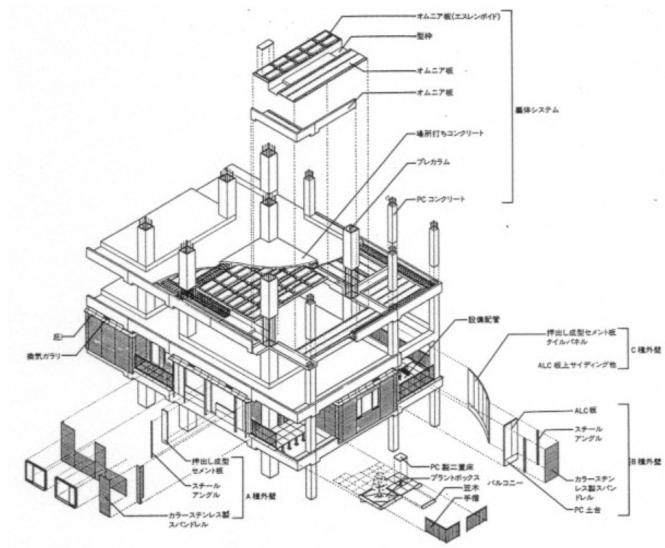
Likewise, forms like patterns and types, as I will discuss under items four and five, are vehicles for the coordination of our designing. When we do not seek common ground we do not need them. Levels of intervention, as discussed as item seven, hierarchically relate design responsibilities (for urban design, architectural design, and interior design, for instance). If the project is seen as a top to bottom job in the hands of a single party, the articulation of levels is easily ignored; the distinction becomes blurred and the product monolithic. Systems, discussed under item three, are pre-determined sets of parts the spatial relations among which are rule based. We will only honor systemic constraints when we are prepared to accept rules and selections already used by others.

Thematic properties are valuable when designing is seen as a cooperative effort. Without such a view they remain unattractive. They demand dedication and exercise to be mastered properly, while no such discipline seems necessary when designing is primarily seen as a form of self expression. Moreover, they lack glamour. But their application will make fields prosper.

What is shared needs to be taught; it is the very substance of curriculum. We expect the individual teacher to contribute something unique. Rightly so. Nevertheless, an education must first of all be an initiation in common skills and their architectural application. The quality and scope brought to that task are what should distinguish a good school from a poor one. A gifted teacher, of course, will also be able to teach a gifted student how to transcend the thematic, not only rendering the field healthy but making it bloom.

In the last chapter I expand a little on aspects of teaching thematics and how it relates to teaching studio. I draw from my experience with the Thematic Design course already mentioned earlier. This was not a course about designing, but a design course. Students were given assignments requiring them to make form. The emphasis, however, was on skill and method, not on meaning and expression. As thematics is the source of complexity and richness in the field, my hope was to make students feel at ease with complex form and the transformation of it. This, to my mind, constitutes the essence of our design abilities.

Finally, these being the days of the computer, a word should be added about the use of this instrument. Experience has convinced me that the professional pursuit of thematic qualities needs the computer. This is not surprising. The problem of thematics is a problem of our time. The tools of our time should be in sympathy with it. Thematics is based on principles of transformation. The computer can transform easily. Thematics produces complex forms. The computer helps to render complexity transparent and to make it manageable. Thematics implies the sharing among designers of data on form. Computers are good in making data accessible. In short, the computer is highly compatible with thematic designing.



One: Managing Parts

Even the most unruly and idiosyncratic architect expects those who design for him - underpaid talents perhaps, or voluntary student workers coming in for an exposure to the master's ways - to somehow absorb his way of making architecture. The office employs an architectural vocabulary of its own. Those who do not 'get it' will soon be out.

Technical details and material parts are both the elements and the result of architectural articulation. Even in the most informal office, old drawings are kept for future reference. Often the master himself will return to previous solutions, pull out old drawings for details of a door or window, or a roof's edge, and transform them for new use. In their effort to implement his intentions, employees will keep track of things with more or less explicit consent from the boss, making sure past experience can be re-used.

Recycling details is basic because creating a good detail takes time. One must be sure it performs well and has no technical flaws. Knowledge thus gained must be preserved. Yet technical performance is but one dimension of the issue. A library of details reflects the firm's architectural vocabulary. Decisions on details are architectural decisions.

The management of successful details has long been normal to office practice. Large firms keep well organized libraries of details from which designers and job captains can draw. Takenaka, perhaps the largest design and engineering firm in the world, has a high level standing committee to review their details and parts library. While project architects and job captains cull from the library, they are free to transform what they choose, or to create new items. Projects are reviewed after completion to find out how existing solutions have performed, and to preserve new and better solutions, updating the library accordingly.

Details are soon related to parts. A window, a dormer, a doorway, a bay window, a cornice, a porch, stairs and bannisters, each are more than the sum of their details. Here too, past solutions are transformed for use in new projects. Management of such architectural parts, composed of a number of interrelated details, is a next step.

Libraries of parts and details, either informally or formally organized, are unmistakably thematic. Within the office culture they are shared knowledge, collectively maintained and used. They are what makes a group of designers and draftsmen into an office: forms shared within that social body. When offices grow, explicit management of details and parts must help preserve the architectural coherence of the firm, if not to maintain its efficiency and technical standards.

A few decades ago, the use of the computer as a tool for designing was new. Some architects would apply it because clients might be seduced with computer based drawings. Others thought it a useful device to make details and keep track of them. Usually, the computer made headway as long as the architect himself need not change his ways, and could continue using parallel bar and drafting board.

One of my friends did it the other way around. He hired a programmer, bought a computer, and began to use it himself as a design tool. This changed the office's culture. Because the boss had one, every designer and draftsperson wanted a computer. He soon found that the computer made it worth while to formalize the office's library of parts and details. No more copying from old drawings. Parts are kept in a computer driven database to be instantly available for transformation to new uses. The system is not only efficient, but sustains a strong and coherent architectural identity.

This story is typical for a worldwide process of change today in design practice. Commercial computer programs now allow the use of parametric elements that can be stretched to appropriate sizes and sub-parts of which may be specified. Given a prototype of a window, for instance, the number of mullions can be determined and the dimensions decided upon. The efficiency gained is obvious. The parametric form can be called to the screen immediately and rotated in three dimension. Transforming it is much easier than changing an existing drawing, even from another CAD drawing.

Feeding a parts library into a computer is a time consuming affair - prize to be paid for future efficiency. Specialized architect-programmers offer libraries of parametric parts for sale so an office can just buy them. Such commercial libraries may next be adapted to an office's preferences. Parametric parts are also custom made on request. Larger offices may find it advantageous to do their own.

More and more, designing is done from a kit of parts. Parts that can be stretched, shrunk, and otherwise transformed, to be sure, but nevertheless parts already known.

Moreover, parts and details increasingly come from catalogues of manufacturers. Doors, windows, bathroom equipment, kitchen equipment, curtain walls, and facade cladding of all kinds come from industry catalogues.

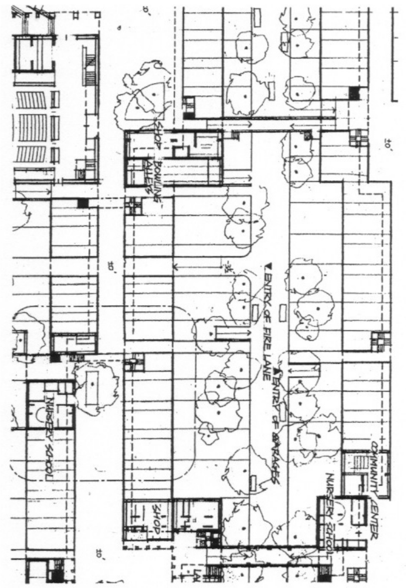
Whole integrated systems are offered by the manufacturing industry. Ceiling systems including lighting and ventilation fixtures, partition systems, kitchen systems, facade systems and so on come with detailed information about how compositions can be made from their parts.

Commercial systems must offer substantial flexibility to serve the market. The aim is often to sell basic parts like aluminum profiles for windows, or tiles for ceilings. A broader systematization is offered for the benefit of designers. They are shown how windows can be composed and detailed from the catalogue of aluminum profiles, or how ceilings can be designed using the tiles.

More and more, the building is a composition of systems made available in an open market. Within each system, parts can be selected, transformed, and combined. Manufacturers will be quick to realize how the computer facilitates this process. Before long we can expect that many will provide their product documentation in CD rom disks with parts ready for use in CAD systems.

Thus industry educates designers to facilitate use of its products. Already in the Netherlands, a consortium of producers of roof tiles offers not only an extensive catalogue of details for the design of whole roofs - including trusses, gutters and connections to walls and facades

Two: Against Program



Recently, I visited a Dutch developer who had his headquarters in an apartment built in the thirties in the Amsterdam school style. The apartment obviously had been designed for a well-to-do family with a busy social life, in the habit of giving parties and dinners. It had a large central space around which other living spaces were arranged. More private spaces were reached from the center by small hallways. All office activities fitted in smoothly without apparent need for alteration. Now, business visitors were the guests to be received in groups of various sizes. Individual offices and spaces for secretaries occupied former bedrooms and guest rooms. Good architectural space allows human beings to settle and congregate in many ways for many purposes.

Two decades ago an international hotel chain bought a good deal of contiguous property in the historic center of Amsterdam. Their proposal to replace the old houses with a modern high-rise hotel was rejected by the municipality. Now the Pulitzer hotel inhabits the houses it initially intended to replace. Originally, houses on both sides of a city block had backyards between them. The merged backyard spaces are now occupied by passageways and lobbies enclosing garden courtyards. Hotel rooms are in the houses, up to four stories high, and look out on the canals or onto the enclosed gardens. They are equipped with all facilities expected from a first class hotel.

Amsterdam canal houses, initially built for merchant families to live and conduct their business in, now accommodate offices of lawyers, bankers, consultants, and medical doctors. Others hold shops, restaurants and even small theaters. A good deal of residential use is still found on upper floors. The phenomenon is not exceptional. In most historic fields still in use today, a variety of new modes of occupation is found. True fields survive and endure by their capacity to absorb an ever varying range of uses.

A “hotel”, a “shopping mall”, or a “school” give us specific ‘programs’. That does not necessarily mean that they need specific forms to inhabit. The idea that program makes form is a vestige of the functionalist approach of Modernism. The designers who could creatively fit the program for a hotel in the block formed by historic houses might equally well have done a school, a shopping mall, or the headquarters of a corporation, using the same buildings.

Human activities make human beings inhabit human size spaces. The space behind two windows of a canal house can accommodate ten or twelve persons meeting, four or five persons working, a spacious private office; a hotel room for two. A single window allows a small secretariat, a waiting room, or a single person's office. Inner space around stairwells is good for bathrooms, storage, a xerox machine, or a pantry. The full space between two party walls, running from windows at the street side to those over the garden, can hold an aerobic class, a restaurant, or an administrative work unit. Several such bays, strung horizontally, or combined vertically, make a company's office.

The historic urban field was not conceived by function but by type and territory. The house's spatial arrangement always had a certain autonomy. From culture to culture house forms have varied greatly. Yet closer scrutiny reveals a constant in the way of a rough classification of space sizes. There are 'normal size spaces' that fit daily functions of human inhabitation. There are larger spaces that tie these normal spaces together and give them orientation, and there are smaller spaces serving the normal.

The arrangement of these three kinds of spaces determines the way publicness and privateness can be played out; light and air are let in, circulation aided by stairwells and doorways is organized. Examples abound. We may think of the Pompeiian courtyard house where the normal size spaces, seconded by smaller spaces, encircle atrium and peristyle. This type belongs to the large and varied species of courtyard houses. The Venetian Gothic 'palace' has on its main floors the central space running from front to back, on both sides of which normal rooms are aligned. The Parisian eighteenth century 'hotel' - the patrician's house - has its courtyard accessible from the street leading to the suite of major spaces on the main floor of the main house in the back - the courtyard otherwise being formed by normal size spaces reached by stairwells in the corners. In the Amsterdam canal house the dominant space connects to the street by a stoop. It is high enough to allow for a mezzanine floor in the back and lighted by tall windows on the canal side. The English Medieval 'Hall' was a large dominant space, gradually seconded by more normal size spaces in adjacent wings, in upper floors, or otherwise included in the primary volume.

Spatial order of the normal, the large, and the small is tied to the size of the human body and its social groupings. It offers an open ended mode of operation. It may expand in more elaborate hierarchies, or degenerate into more primitive instances. But each culture has its own way of using it. Programs do not make such order, they inhabit it.

The house's spatial order soon aggregates into a field, forming urban space compatible with it, producing thematic continuity. Special buildings -churches, palaces, town halls - and special urban spaces complete such fields, accommodating larger human congregations or serving the powers governing them. They relate to the basic order of the field in the way flowers relate to leaves of the same tree: akin but markedly different.

Today, fields include large infrastructures for transportation and utilities, spawned by urban conglomerates of millions of inhabitants. They rise vertically in large buildings, filling volumes large enough to become three dimensional fields by themselves. On the scale of human inhabitation, however, such as the dwelling unit and the work place, age old principles of spatial order still apply, but take radically new shapes. Programs do not explain urban form. Spatial order does.

In the field's physical continuity we must appreciate the continuity of intervention. Refurbishing town houses by filling in a hotel is not a basically different process from refurbishing an urban fabric by building town houses. Separating public and private space to structure a neighborhood is not basically different from separating similar spaces inside a high-rise building. In all cases there is physical continuity and transformation over time. What is done today re-interprets what was done yesterday and offers thematic interplay to what will be done tomorrow. It is worth noting that the concept of program covers only part of this continuity of intervention. It is tied to human scale inhabitation and loses meaning on the larger scale. To execute a program we bring in parts needed for the desired action in the designated space: additional partitioning, furniture, fixtures, connections and utilities. Again: Program cannot bring spatial order. Spatial order must already be in place and may be modified to accommodate program.

The student who is not familiar with autonomous spatial order and is given a program to make a building will attempt to extract from it - in some way never explained to him - the form he is asked to produce. He will fail to do so. Functionalism, the demon that produced this misunderstanding, is long dead. But now that form does not follow function anymore, programs are still given to kick off a design exercise. If principles of spatial order are not taught or only implicitly passed on, program is the only tangible information the student has to work with.

We all know that it is not possible to derive a form from a program. No matter how long we may study it and whatever diagrammatic analysis we may apply to it (space bubble diagrams) the form does not come from it. There is always that uneasy and intuitive leap towards the form. If spatial order is not familiar, it is a leap into the unknown.

If the objective is to teach the student how to work with a program it is best to give a second-use problem, like the hotel mentioned earlier, where spatial order is already established. This works two ways: it demands the study of intricate and elaborate programs, while it offers at the same time a good introduction to the structuring capacity of predetermined spatial order. After an assignment like that the student will have experienced how a well articulated and well ordered space, space that is not neutral at all, is the most flexible space there is. She is then ready to create some primary spatial order herself.

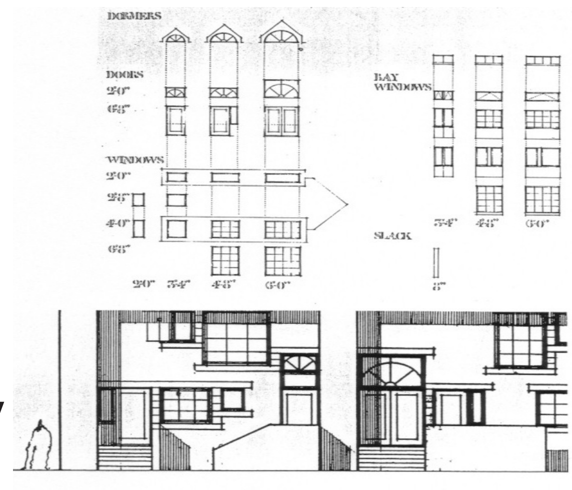
In studio, there are no clients to tell the student what they want. Programs are a poor substitute because they do not allow for the give and take between client and designer. Nevertheless, if the design in school must imitate professional life, a program may be justified.[2] If, however, the objective is to acquire skills in handling architectural form and space, the program can be dispensed with. Formal exercises in spatial ordering are needed.

Spatial order is necessarily thematic. It connects to what is already there and requires knowledge of precedent. Familiarity with types, patterns, as well as spatial systems will help. These are subject of the following chapters. They are manifestations of thematic qualities. Replacing program, they should drive the design exercise.

Students may be encouraged to do a building in a given field and base their decisions on the site and the extant thematic qualities of the field, adding to it their own preferences and understandings. They may be given spatial and material systems to work with, but no program. They may or may not have certain uses in mind to justify their decisions but this may change in the course of the design process. Discussion should be on spatial logic and consistency. I have learned that a design exercise without a program produces, when given, a few moments of panic, but then concentrates the student's mind wonderfully on architectural and thematic properties. Once the student has discovered that these properties offer a firm source to work from, he is ready to deal with programs.

Once the form is designed, one may look into a program and adjust the form. This second activity is a throwback to the exercise of filling in and adjusting an existing form as previously discussed. It should be routine by then. But there is another way. The student can be asked to invent one or two programs for a form she already designed without one. If that proves difficult, the form lacks thematic qualities. This reverse procedure should not be surprising. It is not unlike doing urban design complete with public spaces, and deciding later what buildings will be built in it.

2 See also the last chapter, on the role of the studio



Three:
Systems-Collective Property

Three ways can be distinguished by which collectively sustained form is manifest in the field. Each merits separate attention.

In this chapter I will speak of **systems**. These occur where a number of parts, chosen from a predetermined set, are distributed following rules of selection and relation. All systems have thematic qualities. Although we make instances of our own within a system, the system itself is a collective property.

Patterns occur where only a few, usually no more than two, parts are consistently related. Here we can follow Alexander's example. But in the next chapter I will argue that patterns are primarily vehicles of agreement and thematic development.

Types, finally, are the most complex manifestations of shared values in built form. They are integrated wholes. As such we may distinguish in them both architectural and technical systems as well as numerous patterns. But we should strive to leave them wholes because therein lies their power to sustain collective creative processes.

The field thrives by systems, types, and patterns. Being conventional they are always partly implicit. This is true for both technical systems as well as for architectural systems usually called styles. Patterns are often followed without any explicit reference. Types, as will be explained later, defy explicit description by definition.

Systems can have a highly architectural content. Architects and builders in Seventeenth Century Amsterdam, for instance, produced facades of strong and consistent kinship. Everyone used the same set of parts - windows, doors, stoops, gables - detailing them in a similar way and arranging them, according to shared rules, into instances of the same thematic system. While each facade has its individual identity and the designers of many are known, the system of which they are instances is a collective creation of extraordinary sophistication.

Aaron Fleisher (a Professor at MIT) and I once worked on a computer program to study instances having properties of seventeenth century Amsterdam canal house facades. We did not expect to imitate life. We only aspired to define the thematic system in it. We sought to define the parts library used for these facades and the rules by which the parts are related to one another, having thus extracted, from the many extant examples, the system they collectively belong to.

By adding or subtracting parts or rules of relation we shift the boundaries of the system we believe we see. The use of the computer here is essential. Having a program that can instantly produce examples, we can tinker with the system's structure and make adjustments, seeing immediate results. Without a computer such rapid give and take would be impossible and our experimentation would be excruciatingly slow and laborious.

The Amsterdam facades are systems with a high architectural content. The same is true of other examples like, for instance, the classicist system of architectural orders. Technical systems are more malleable - post and beam structures for example, or load bearing masonry walls combined with timber floors and roofs. These are systems within which we can build a wide variety of forms. They each allow a range of possible architectures. But nevertheless they are not neutral and do inspire architectural articulation. Purely technical systems like those for plumbing, or various utilities, impose their constraints on form making as well, but at a much larger distance.

If the systems concept can be interpreted so widely as to range from the classical orders to plumbing, it should be appreciated that in all cases there is a social contract among those applying a system. The purpose may vary from the aesthetic and symbolic to the purely practical, but the mechanism is the same: certain parties agree to work with certain parts in certain relations. They shape the parts accordingly, and deploy them following relational rules. To operate in a system is to join a social body. To change a system is to convince others to change their mode of operation.

Because systems must live in a social body willing to sustain them, most successful examples have not been invented, but were gradually developed within a society of actors. In that sense systems have vernacular properties. What we normally call 'vernacular' systems - suggesting a lack of formal authorship or professionalism - are among the most resilient and durable. The story of Hassan Fathy's study and advocacy of the mud-brick vaulting systems of upper Egypt gives us a good example of how a technical system of strong architectural quality, in use for millennia, can die out, not for want of performance but because the social body sustaining it shifts its allegiance to other ways of building for social reasons.

All systems, even the very high-tech one's, develop, change, and bloom through use. To learn about them we should connect to the group that applies them. Books will only tell us what is no longer in discussion. The fully documented system is a dead system.

In pre-modern times, designers and builders, as well as their clients, operated within a limited and well established range of systems. There were fixed ways to build and to design. Although we may be sure that over time such systems changed like all living entities do, their change would be incremental and the system would endure. One could operate for a lifetime within the same systemics.

Today's world is pluriform. The range of environmental systems has extended. At the high end we have a large number of infrastructures for transportation not known some time ago. At the low end we have a proliferation of utilities - heating, ventilation, telephone, television, computing, electric power, gas, plumbing, and so on - bringing conduits of all kinds, navigating the built environment to serve each nook and cranny of it. In the mid range where habitable space is made, we have steel, concrete, masonry, timber structures, and a host of hybrid cases to work with.

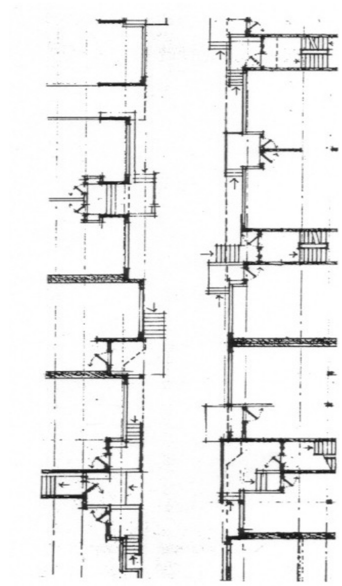
Partly to cope with this dynamic variety we have learned to use systemic abstractions speaking more generally, for instance, of building morphology or spatial orders, translating them later into specific materials and products.

In their professional life, students will be exposed to a host of systems, both technical and architectural, material and spatial. Any single building to be designed is a combination of systems, representing particular parties designing, installing, and maintaining them. Technical systems may change from one job to another. It is not unusual for a practitioner to design a timber frame house one day, a steel structured and curtain wall cladded high-rise the next. Spatial systems belong to building types and fields. Today's professional will operate in a variety of contexts holding very different spatial systems. She needs the ability to shift from one systemic mode to another: to quickly grasp the qualities and range of a new system she is confronted with, and to see the systemic behind stylistic preferences of clients and collaborators.

Architectural education therefore should sustain a consistent and comprehensive inquiry in the thematic properties of systems in the built environment. It should touch upon a host of questions raised by today's pluriform conditions. For instance: Is it still possible and desirable for an architect to operate within a limited range of systems, in the way Wright built in wood and masonry, Corbusier in concrete, and Mies in steel? We know of course that they each escaped these limitations from time to time. To what extent were the limitations self imposed? Can one really master a broader range of systemics? To what extent does a training in systemics enhance our ability to broaden that range? How does this question of limitation of expression versus broadening of reach relate to the management of design and the distribution of design specializations? How does it relate to the abstraction of form? It is not difficult to expand the list of questions relevant to architecture once the thematic properties of systems are taken into consideration.

These properties must also structure the way we devise exercises for students to develop systemic skills. The fact that one enters a social convention as well as a physical system must be recognized. In school the social dimension is inevitably academic. Learning to work with systems may connect to the teaching libraries for parts and details advocated earlier. Faculty, already in control of a teaching library may build from it an architectural system and offer it to students to work with. Exercises should not aim at a finished product but encompass a range of instances intended to explore the potential of the system and to discover its boundaries.

When sufficiently adept within the given system's range, students may be encouraged to adjust it to their own preferences and offer new examples of instances to illustrate the impact and potential of their modification. In the spirit of shared sustenance of systems, other students may be asked to assess such alterations by working with them.



Four: Patterns-Engaging the Clients

At the time when Alexander's pattern language first came to our attention, an architect friend, sensitive to thematic values, told me about a job he got designing a neighborhood for a housing corporation. At the first work session, when the client team expected a first sketch plan, he showed slides of all kinds of streets, building types, parking solutions etc. soliciting response: "Is this the kind of street you have in mind? Or is this a closer example? How about parking like this?, How about front yards, and what about trees and sidewalks?"

To the next meeting he came with alternatives for street-house relations, parking solutions, play grounds, house types, street profiles. He made it clear that he was seeking to reach an understanding as to what the client and he would work on.

Similar sessions were repeated. The client team became restless, afraid time was being wasted. Finally they were shown a detailed plan for the neighborhood. Thanks to the preceding process nothing in it was foreign to them. A meaningful discussion could follow. Obviously, the client team did not accept everything proposed, but there was common ground and therefore no one was shy in suggesting changes, confident they knew what they were talking about. The process turned out to be efficient and productive.

This example makes one think of the use of patterns in the way Alexander taught us. There are similarities, but there is an important difference. Here, the decision as to what patterns should be used was the outcome of a dialogue. The 'good' pattern was the pattern accepted by both architect and client.

Another colleague I know uses Alexander's patterns in a more formal manner. I remember him using patterns when designing a teaching hospital. Asked to interview medical doctors and their staff to find out what their needs were, he wrote patterns and submitted them to the users for discussion and approval. He asked users to suggest patterns themselves. This provided a structured format for what otherwise might have been too open ended a discussion or too technical a process for the users to be comfortable with. Sharing the principles of pattern formulation, both architect and user group could generate proposals and judge those put forward. Jointly accepted patterns became part of a program, acquiring contractual status.

No contemporary book on designing has been sold as consistently and as widely over such a long time as Alexander's book on a "pattern language". But after an initial debate when the book first appeared, there is hardly any mention of patterns in design literature. Few, if any, architects report on the use of patterns and few teachers use patterns in their curriculum although they may very well introduce the student to Alexander's work.

The contradiction between a continued interest in the book and the paucity of evidence of actual use is intriguing. Does this mean that generation after generation of students bought the book to put it on the shelf after reading with no intent to use it? Or is it that those who actually use it are reluctant to admit it? There seems to be an intuitive response to the pattern language that does not figure in today's architectural discourse. Alexander's work needs to be seen in the context of thematics to be fully appreciated.

It is not clear, however, how Alexander himself wants us to see his patterns. He proposes them as generally true and valid, produced after due research and careful observation, and seems to suggests that somehow there can be proof that a pattern is 'true'. Even if the claim for timelessness of many patterns is convincing and many more are inspiring, we would be as happy to use them without proof of truth. By casting each pattern as a 'solution' to a 'problem', sensible arguments for their usefulness acquire an unnecessary deterministic flavor. We may have our own reasons to approve of the same pattern.

Patterns are good thematic instruments for coming to agreement on qualities in the environment. They are limited in scope, usually comprising of a few parts in a certain spatial relationship, and therefore lend themselves to clear description and focussed discussion. Patterns help to establish common ground with those who inhabit, pay for, and manage, what we design. This is a help much needed because, in today's pluriform world, we meet different environmental preferences from place to place and problem to problem. We need ways to find our bearings and connect to the social body we serve.

Patterns are excellent for a student's first introduction to thematic form. A workshop may be assigned to observe a certain neighborhood and determine what patterns help shape it. The effort should be collective in that participants be asked to agree about what patterns are to be distinguished. The parts that make a pattern should be clearly defined and their relation established. The pattern's value and use should be debated and formulated.

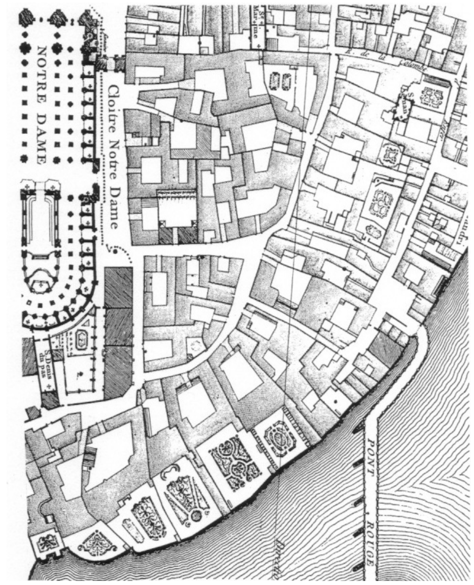
This kind of workshop is akin to those where an environment is 'read'. There is a difference, however. The goal is not just to come to a particular reading but also to master a tool applicable to such reading. The neighborhood we 'read' is thus a means to learn about the tool as much as the tool is a means to 'read' the neighborhood. The wholeness of the neighborhood brings into perspective the merits and limitations of the tool. The tool throws light on properties of the neighborhood otherwise less easily grasped. Students should come out of the workshop in firm control of the tool and with a better appreciation of a neighborhood's properties.

Exercises in on-site observation like this can be made more comprehensive by including the application of thematic systems and types in addition to patterns. (The former were already discussed in the previous chapter, the latter will be discussed hereafter.) All three provide ways to document thematic properties in the field.

The discussion of thematic qualities distinguished in such a variety of ways should, by implication, reveal non-thematic qualities as well: the one-of-a-kind instances that are equally important to an appreciation of the field. The mutual dependence of the thematic and the non-thematic should be a recurrent theme in the deliberations among workshop participants. After all, it is only in a thematic environment that the exceptional comes into its own.

Observing patterns must lead to their use in designing. Like systems and types, patterns are most meaningful when shared among a group of designers. Students could, for instance, be asked to build in a common site, using the same patterns, (and systems and types,) but designing for different purposes. This reverses the traditional studio task. Instead of all students having the same program, and trying to make their building as different as possible from the next, they now are asked to share thematic form, but must respond to a variety of uses. Students will discover, perhaps to their surprise, that the shared thematics help, rather than obstruct, their desire to establish an identity of their own. Once more they will find that individuality exists by the grace of commonality.

Five: Types; Sharing Wholes



In a class on thematic design, I once submitted material on a number of well known house types - such as the Venetian Gothic palace, the Pompeiian courtyard house, the Amsterdam canal house, and the Georgian terraced house - asking students to choose one type, study it and produce an instance of it.

After looking carefully at a number of examples of the type of their choice, students produced a reasonable specimen of their own. To be sure, there were anomalies to be corrected by subsequent comparison, and closer scrutiny would yield details not seen before. But generally I was impressed by the ease with which they 'got into' the type.

The second exercise turned out to be difficult. Groups of three or four students were asked to formulate in words the rules capturing a type. Lengthy disputes arose as to what aspects might merit formalization. Different individuals advocated very different qualities they thought most characteristic to the type. Some tended to stress a material system. Others saw primarily a spatial arrangement. Again others saw discreet architectural parts - doors, stairs, facades - arranged in patterns. Some saw a single feature representing the type, others saw many.

This experience taught me that a type is a whole. It allows many views; all valid, but each reducing the wholeness and thus failing to satisfy all observers. Partial views by themselves can be helpful for specific reasons. Systems, for instance, can easily be distinguished in a type. We may see a spatial system, or a way of building. We may pick a single technical system - for plumbing or ventilation perhaps - and see how it performs within the type. Function may be related to type too. Such different views need not be in conflict with one another, but their sum is always less than the whole.

Types remind us that wholes escape description and analysis. But we need no wholistic formulation to work with a type. By designing within a type we can recognize the wholeness without having to capture it in words, diagrams, or other descriptions. A type is understood in a seeing-to-acting mode. Eluding description, it can nevertheless be subscribed to. One's action may only cover part of the type - geared towards a specific system or coming from a certain specialization - but can nevertheless respect its integrity and wholeness.

Architect, builder, lawyer, developer, and user each know the type in their own way. But where they must cooperate, typology gives common context to their actions. With a system, as we have seen, we enter a social body of like specialists. Within the type we meet other specialists in control of other systems. Producing an instance of a type demands concerted action. It is the manifestation of a shared knowledge that cannot be expressed otherwise.

If the type brings efficiency in interdisciplinary cooperation, the reverse is true as well: The further we stray from a shared typology, the faster problems of coordination multiply. Hence the resistance, in daily practice, to random innovation, and its preference for deliberate cultivation, and gradual change, of what is already known.

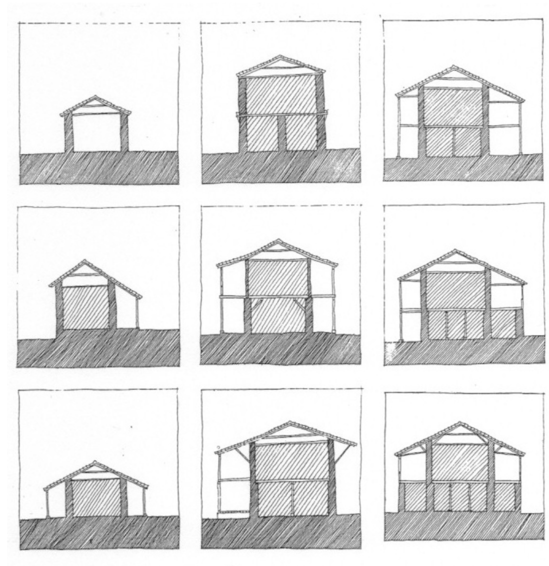
Type always made possible the creation and maintenance of intricate physical organizations like buildings and cities without much formalization, reducing the need for programs and rules, and simplifying specification. That implicit world is still with us to a larger extent than we may be willing to acknowledge. The power of type may be as strong today as it was in the past. We understand, for instance, the skyscraper as a type. It embodies a wealth of experience accumulated in more than a century. A specific variation on it can therefore be appreciated; the coordination of its many designers, consultants, contractors and sub contractors, can be undertaken. Similarly, suburban house typology is well developed. An entire real estate industry is based on it.

When we introduce the architectural student to the thematic significance of the type, we should not shy away from historic examples. Their richness and coherence remain an inspiration. But we should also investigate present day types, particularly those found in big building projects. Here, typology is predominantly internal. We cannot say a hospital, a hotel, or an apartment building must have a certain external shape. Being fields themselves, they can be known by their internal spatial order. We come to realize that typology generally is a matter of inner structure first of all. In the big building this is inescapable.

A uniquely contemporary typology of internal wholes is the fruit of modern times. We may think of the apartment in the residential high-rise, the work unit in the office tower, the shop in the shopping mall, the terminal in airports, the classroom in schools, and the nursing unit in hospitals. These relate to the spatial and physical structure of the big building in the way the historic house type relates to the spatial and physical structure of the town. In both cases the small scale type helps generate, sometines to a significant extent, the large scale structure. But once the larger structure is in place, the types that inhabit it may evolve and change.

How to give the student experience in designing with types? The interdisciplinary coordination which is so much the type's strength is difficult to capture in an educational setting. But exercises in which spatial and technical interpretations of the type are explored and compared are worth doing. For example, a variety of instances of the same type may be generated by playing with the type's spatial system while keeping material systems constant. For instance, developing a range from minimal to maximal size of the same type is a good design exercise. Alternatively, material systems may be changed and their impact on spatial variations considered.

Six: Transformations



Types, thematic systems, and patterns all imply transformation. They are not standards to be mindlessly implemented, nor templates ready to be copied. To use one in design we must make our own instance of it. To make a new instance is to transform instances already known.

Patterns are the simplest entities from which to make variations. Basically, patterns proscribe relations between two parts: a room must have corner windows, for instance, or a parking lot's location must allow us to see our car from the front door. The parts may be specified in a number of ways; their relation may allow for a range of interpretations. We may, for instance, think of different kinds of corner windows, or we may find a new way to connect the parking lot to the front door. By choosing different parts and articulating the desired relation in a new way, we make our own instance of a pattern.

Systems may be more rigid in the relations of their parts. The way a lintel rests on columns or a floor rests on a wall may be subject to details that cannot be changed much without changing the nature of the entire system. But systems can be very flexible otherwise. For one thing, we are not restricted to a few parts. We may deploy many columns or many walls. For another, their distances may vary greatly within a certain range, allowing a wide range of configurations.

Moreover the system may have many different kinds of parts, and we need not use them all in a single instance. The canal house facade, for example, may have windows, doors, gables, entablatures, mouldings, stoops, and decorative sculpture. While the designer must choose a door and windows to make a true facade, he may forego a stoop, or prefer an entablature over a gable. He may choose a certain model of windows or use more than one kind of window in a single facade. Hence, working within a system we make a selection from a kit of parts. The deployment of that selection, although constrained by relation rules, can be done in many ways.

In typology we know by experience how a single type allows for a wide range of interpretations. No two instances are the same. There can also be a great difference in size. The smallest Pompeiian house entails no more than a primitive atrium with a few rooms. The largest specimen covers a city block and has atrium, peristyle, and garden surrounded by scores of rooms of different size and importance. One can make a series of transformations leading from the most primitive instance to the most elaborate one. Given a same size, again each instance is a transformation of another.

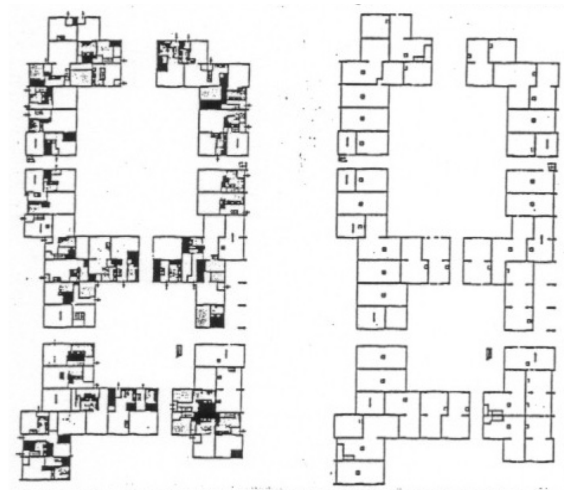
The field's continuity as much as its structured complexity are derived from sustained processes of thematic modulation. The well cultivated field shows one variation after another of patterns, systems, and types. While in thematic design principles of transformation are inescapable, we begin to realize that all designing rests on transformation of what is already known. All that is new comes from what already was.

In processes of transformation discreet steps can be distinguished. I call them 'moves' because they bear similarity to the moves we make when playing a board game, where an initially ordered configuration is changed one move after another. There always are different moves to choose from, and each move in turn makes possible a number of others. **Displacement -** for instance the increase of a distance between two walls - is a move. It may lead to a lengthening of the beam spanning between the walls. **Transformation of a part** is another kind of move. Or the increased span may lead to the replacement of the beam with a truss, **substitution** also being a kind of move. Alternatively we may place a post between the walls to relieve the beam when the span increases - **introduction of a new part** is yet another kind of move. In this way one move calls for another, but there is always choice and hence moves require judgment; they are design decisions.

Adding move to move, simple forms can soon become quite complex. But they remain under control. Arriving at controlled complexity is an experience students do not easily forget. It gives them self confidence. Designing by transformation is like a conversation with the form. One enters a conversation with a certain purpose, but the result cannot be known beforehand. We can steer towards the general direction we seek. There is always a choice of responses and comments. But the exact result of a conversation is seldom predicted. Similarly, we may feel at ease with our making of moves, listening to the form suggesting them, keeping our general bearings, without knowing in advance what the final result will be.

I have reported elsewhere[2] on my experience with exercises of transformation assigned in a course on thematic designing. Transformational skills can be taught by giving a series of short tasks of increasing complexity. Ability gained in one task is applied in the next. Teaching students to work with moves, and to think about moves when designing lends them skills of general use, applicable also when thematic forms like patterns, systems, and types are not specifically applied. Working with moves is as basic as working the scales when learning to play the violin. Once the skill is acquired, we feel we can control the making of form.

2 N. J. Habraken, Control of Complexity, Places, vol 4, no. 2, 1987



Seven: Levels of Intervention

I once was shown around downtown Chicago by a partner of an architectural firm that had done its share of high-rise buildings there. It was a winter afternoon and getting dark. Standing in the street we saw the curtain walls around us become transparent. The ceiling lights in the offices became visible, revealing a randomness of distribution in remarkable contrast to the stark geometry of the buildings. My guide apologetically pointed out that architects had not been asked to include those lights in their design. This was left to the various inhabitants. Otherwise, the lights would be arranged in a more orderly fashion.

Another time I was standing on a balcony of an apartment building with the manager of a public housing estate in the Netherlands. We looked down on the back yards of a row of new town houses separated from one another by wire fences just three feet high. Lacking any privacy, the yards were all uniformly empty lawns. I asked if the inhabitants would not prefer higher fences. “They would,” was the answer, “but if we let them do their own thing it will become a mess.”

The human instinct for control is strong. Modern institutional power, technology and logistics make control from top to bottom possible in very large projects: from the urban site design down to the arrangement of the furniture, the distribution of lights, and the planting in gardens. The large architectural office is equipped for it: it has urban designers, architects, interior designers, and landscape architects working in tandem.

Yet the very distinction of different kinds of designers means that the built environment has a layered structure. There are levels of intervention that we all understand. The urban designer lays out the network of streets and public spaces for the architect to work in. The architect makes built space for users to occupy and for interior designers to decorate and arrange furniture in.

The concept of levels is often believed to be related to scale. This is not wrong but incomplete. Levels only become meaningful to the design process when we define them in terms of intervention. Certain actors operate on certain levels. Levels are people as well as form, and therefore have thematic significance on a par with systems and types. As we saw previously, in the **system** we enter a social body of like minded actors. In the **type** we meet other actors of different specialization in a shared context. With **levels** we find a hierarchy within our own discipline of designers. There are those who have designed, on a higher level, the context in which we work. There are others, on a lower level, who must work in the context we design.

With the advent of the large commercial building a new level of intervention has emerged. The office building provides open floors to be fitted out by tenants. There are specialized design firms doing the customized interior office design and there are specialized fit-out contractors who install it. The shopping mall likewise offers space to be designed and fitted out in response to tenant's needs by designers and contractors of their choice.

These examples show how in large buildings internal levels of intervention can make economic and technical sense. I have been active myself promoting the concept of 'base building' and 'infill' in residential design.

Level distinctions emerge wherever many actors intervene individually and must coordinate their efforts. The fine grained physical quality of the historic city is directly related to its fine grained distribution of intervention, taking place within a common urban structure, producing a hierarchically ordered whole. Historic examples demonstrate how well articulated levels can produce resilient and adaptable fields.

Contemporary buildings are often large enough to contain populations equal to those of entire towns and villages in the past. We must make them similarly fine grained and resilient over time. This demands a recognition of levels of intervention active within the built volume. Like the urban structure with its public spaces, the big building offers a physical structure and public spaces within which interventions of habitation can take place.

In a millennia-old tradition of settlement, the big building has just appeared. Its spatial qualities are still primitive in spite of its structural and mechanical sophistication. So far, public space within it remains poorly articulated. The modern 'atrium', reaching from ground level to the glass roof of the multi story building is the most recent and spectacular innovation. It merits continuing elaboration. But generally, in the large building, a hierarchy of internal public spaces - comparable in quality and richness, but not in shape, to the array of squares, plaza's, streets, alleys and back streets we find in a historic town of similar volume - must still come about.

Walking along the mile long corridor in MIT with its utilitarian and identical doors, I have often thought how nice it would be to have true facades between the offices and the corridor itself. They would identify the occupants and make the corridor so much more attractive. In the large building, the interface between private inhabitation and public space, the 'facades of the infill' if you like, makes an intriguing design problem yet undeveloped. It involves patterns and systems. The shopping mall already has a more sophisticated balance between public space and private identity. The more large buildings, both institutional and commercial, are seen as indoor neighborhoods, the richer their internal articulation will become.

The above speculation about the big building is submitted to argue how a recognition of levels in the field may liberate us from traditional ideas about the urban building and urban space. This is necessary because traditional form concepts are valid only for the limited size interventions history could manage. Yet basic principles remain applicable to new forms. When thematic continuities are observed, the big building becomes a field among fields, known, like all fields, by its internal structure rather than by its external shape. The level distinction makes us see how age old hierarchical principles may lead to new manifestations under new conditions.

There is a tendency in architectural education to seek subjects that allow the student total control with minimum outside constraints. This leads inevitably to the smaller building with a specialized program. Many forms of everyday inhabitation - the office, the shopping mall, the apartment building and condominium and other large scale residential projects, schools, hotels, and hospitals - do not figure in studio very much. As a building they seem to raise no interest, their programs are deemed too constrained, too unwieldy, or too complex. In short, it is understood that they escape the control of a single designer.

Visiting a house offered for sale we may walk into an empty room and say: “This could be a guest room” or “Here I could have my study”. And we imagine how the furniture could be placed and may even consider a number of alternatives. When we do so, we assess the capacity of the space to hold certain activities.

In a similar way an urban designer may subdivide a city block in lots of a certain size, because that size allows the building of a town house of a certain kind. The lot size is decided upon because it has the desired capacity.

On another level the architect of an office building must decide the distance between columns as a basis for the design. He will compare possible alternatives by sketching how a bay allows subdivision in work stations or smaller rooms, and how multiples of it may produce useful floor surface for expected sizes of occupancy.

Assessing the capacity of a given space is such a common operation that we hardly pause to think of it. Yet it is worth attention as well as formalization. Capacity of a space links a given form to function. But it differs in two ways from the tired form-follows-function routine. To begin with, the form must be there first. Secondly, it relates the form not to one function but to a number of possible alternative functions. Our assessment of the room, for instance, concludes that it can be either a guest room or a study. The chosen lot size may hold a residential building as well as a shop or a small office. We do not decide on function but evaluate the form.

Analysis of capacity assumes a distinction of levels. The room is the higher level form. The furniture arrangement, by which we assess its capacity, makes another level. The bay size, as determined by party walls or distance between columns, makes space on the building level; the partitioning walls by which we may subdivide that space operate on a lower - infill - level. The lot is urban form, private land closely related to the arrangement of streets and other public spaces. The building alternatives by which we justify the lot’s size and proportions are another level.

We may again work in two directions, upward or downward in the levels hierarchy. When we walk into a room and assess its uses by imagining the arrangement of furniture, we operate on the lower level to evaluate the higher level form. This is a familiar activity somewhat akin to site evaluation.

But when we operate on the higher level looking downward, capacity analysis becomes a tool to justify the decisions we make relative to the lower level. The urban designer will conduct a study of building types and their dimensions in order to settle on a lot size and a block configuration. The architect will conduct a study of typical arrangements of office furniture and partitioning to settle on the column spacing for the office building. In this way we conduct a lower level design exploration, not to determine what will be done there, but to make sure that decisions made on the level we operate on provide the adequate context for lower level intervention by others at a later stage.

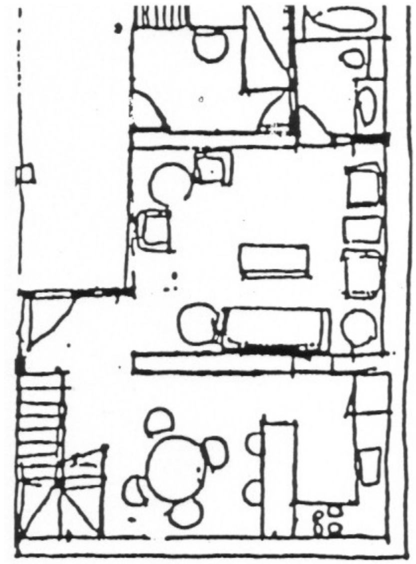
Capacity analysis links designing on different levels. It offers a means to assure the hierarchical continuity of the environmental form without freezing it from top to bottom.

For a form to have meaningful capacity at all, it should not be neutral. A well articulated higher level form suggests possible uses. It is an inspiration in the way the landscape - a water’s edge, a boulder, or a tree - may enhance the capacity of a building site. Different parts of the site acquire different qualities. We may speak of a dialogue between levels. To enter in a dialogue one must say something. Here we find an opportunity for architectural articulation not apparent in a case of top to bottom design control.

Capacity analysis provides a way for the computer to be a tool in qualitative assessment. The basis of all such analysis is the capacity of a single dimension: the width of a room, or its depth, the distance between columns or party walls, the width of a lot or of a street. Findings of that kind are like normal space standards, but arranged by size first and function next - a matter of sorting, easily done with a computer. Results can be stored for immediate reference and used as building blocks for capacity analysis of composite situations of more than one dimension.

A computer program that can check on design decisions is certainly feasible relative to basic one-dimensional capacity. While we work, the program may tell us when we violate standards we have set ourselves - leaving us free, to be sure, to correct our decision or to prefer the exception. To what levels of complexity automated capacity checking can be pushed by the combination of two or more dimensions of a space is open to serious exploration.

Faculty may maintain a capacity database for general reference by students doing design exercises. But building up a reference from scratch is a very good way to acquire a sense for spatial dimensions and students may be encouraged to contribute to the capacity database. They must end up knowing capacity of human size dimensions by heart. After all, a skilled designer knows what can be done in, say, five feet: a corridor?, a bathroom?, a sidewalk?, three seats in an airplane? From such basic knowledge a student should be expected to quickly come up with capacities for dimensions and room sizes in his design. We want a student to understand exactly what is gained or lost when a bay size or a room size is increased or reduced by one foot. Working on a single building he may compare parking capacity in the basement with capacity for living spaces and work stations in subsequent floors, to find an optimum bay size.



Eight: Capacity vs. Function

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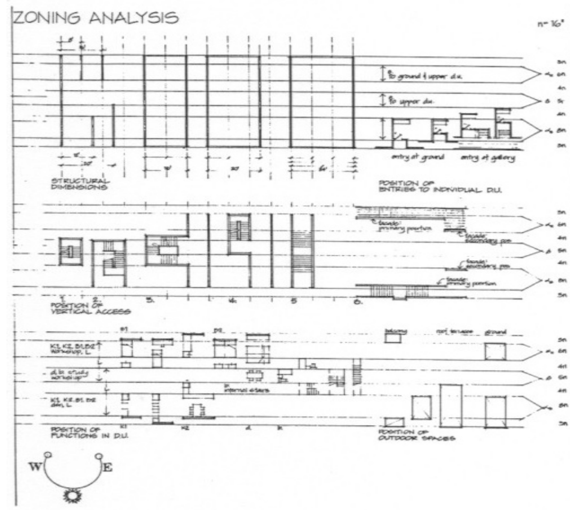
Nine:

Geometry and Abstraction



I have heard it said that the use of geometry is what distinguishes architecture from just building. Be that as it may, for centuries ruler and compass were the symbols of the profession, invariably shown in portraits of architects. Using these tools, renaissance and neoclassicist architects, as much as their medieval predecessors, knew how to construct the square, the circle, triangle, pentagon and hexagon, not to mention the golden mean. Geometry provided a procedure to construct, in a rational and orderly manner, the composition of the whole and the proportions of each part.

In our times, where architecture seems to take geometric solids literally, it is good to remember that throughout history the building was there first. Geometry was an abstraction of the form, the form not an expression of geometry.

When, for instance, we study sections and plan of a Gothic cathedral, we see an almost organic form, but know it can be abstracted into a construct of squares, rectangles, and triangles. In the same way, natural forms like leaves and shells can be shown to have a geometric base as well. Similarly, the Palladian villa, as all other classicist architecture, has its well ordered geometry, but the volumes as built are not derived from it: geometry is used to bring correct proportions to a building already conceived, and to provide clarity in execution.

Traditionally, geometry formalized judgment about proportions. What was thought to be right 'by the eye' was translated in a geometric procedure. Once established, this construction could be repeated, saving time and effort. Formalized procedures allowed those with a less secure eye to come out right anyway. The most pervasive proportional construct is the golden mean. In various cultures practitioners had their own ways to use it. Thus, geometric abstractions were based on conventions formalized in methods. In short, geometry was part of thematics.

In Modernism, the old ways died out, leaving us ignorant about their power in the past. A few modern architects have made proposals for new methods of geometric and numeric abstraction in architecture. The most widely known is Le Corbusier's Modulor. But attempts to continue an age old tradition in new ways did not become general currency. A professional culture that does not seek the thematic sees no merit in a shared system for geometric abstraction.

While geometry as an abstraction of form disappeared, it returned with a vengeance as a means to make abstract form. Geometric forms replaced historic styles recently rejected. The shift may have been caused also by the disarray of technology in modernist times. In the throes of multiple innovations, Modernist building technics could no longer provide a common and stable medium to make form with. Abstract form offered an alternative. Euclidean solids and planes now replaced ways of building as elements for architectural articulation. No longer was geometry a means to interpret a building. Now the building became a manifestation of geometry.

But in modernist and post modernist work the way architecture is made, and hence geometry is applied, remains subject to individual invention. Although pervasive today, geometry's use has little thematic meaning. It lacks a conventional basis. Nor is it wedded to shared principles of proportion or order.

The historic ways of proportion and abstraction are applicable to the single building and its constituent parts. They cannot deal with the continuous aggregation of buildings and spaces that make a field. In history, the town, like the building, could still be seen as a single object of a well defined shape. The squared Roman military settlement as well as the walled Bastides and other medieval town plans were self contained. They lent themselves to treatment similar to that of a building's plan, elevation, or section. In later centuries, star shaped defensive escarpments, as perfected by Vauban, continued the millennia old image of the town as a well defined shape. They were eventually overrun, not by armies from outside, but by the expanding urban fabric inside. From then on, the shifting and porous urban boundaries of ever growing fields no longer had architectural meaning. The field's identity must come from its internal properties.

The compass and the ruler, good tools to make Euclidean constructs for the abstraction of self contained forms, are of little use when we deal with continuous fields. For the latter, we need ways to abstract spatial continuity, freely deployable and expandable, easy to shift and transform. The continuous field established by its inner structure has been imagined already by painters who refused to recognize the canvas's edges like the modern urban field refuses to recognize artificial boundaries. Some of them, notably Mondrian, used geometric images, others, like Pollock, defied any formal structure. All made pictures that seem fragments, cut from a continuous field. Urban fields often have some grid like image, but there are others, notably Middle Eastern urban fabrics, that are very organic in their structure. When we seek a way to abstract fields, it must be applicable to all kinds. Here we encounter a wholly new challenge. How to abstract a field's internal order?

The purpose of abstraction of a field should be to harness the deployment of patterns, systems, and types in their continuous transformations. If a form is to change from one instance to the other, and positions of parts are allowed to shift move by move, abstraction must now be used to guide these dynamics. It must allow us to design a field in a general way leaving open the actual deployment of architectural form.

To this new purpose, the concept of zones may be formalized. I report on my own research in this direction, not to give a final answer to the question of abstraction of fields, but to illustrate the challenge it poses.

Zones are familiar in urban design, linking design decisions to location. A zone may establish a relation between a design requirement on the one hand, and a certain area on the other. In the US, zones tend to be tied to functions, refusing, for instance, commercial uses in residential zones. But zones are more widely used, although perhaps less formally, to indicate locations for certain forms. An urban plan may designate zones for buildings as contrasted with zones for public spaces and circulation.

The city block is a typical example of the latter application. It is a zone, of specific location and dimensions, within which certain kinds of building may be allocated. It may be subdivided by lots. Seventeenth century maps of Amsterdam show a further distinction by subdividing the block not in lots, but in zones for buildings and zones for private gardens - the former running at the periphery of the block, the latter located inside.

The design of an urban field is done by a deployment of such zones. The zone here stands for a variety of possible building combinations that all fit into it. Conventions may be established as to what the zone is allowed to hold (what types of buildings, how high they may be, etc.). At any time we may convert the zone into a conglomerate of actual buildings fitting within its boundaries according to predetermined rules.

Zones can be applied on different levels. Where an urban zone may stand for buildings, zones in large buildings may stand for infill. My own research has explored the application of the concept of zones inside buildings to abstract types of infill. To that end a number of possible zones were defined. A first distinction to be made was that between private and public (like the block and the street). A second distinction within the former was based on adjacency to the outside (like the built zone and the garden zone in the city block.) Certain similar distinctions seem to operate on multiple levels.

In all these cases the zoning makes a link between two levels of intervention. The urban block zone allows the urban designer to design on the level of the urban structure, leaving the block zone to be filled in by architects in the future. Yet the zone, by its dimensions and designated content, stands for a number of buildings. It is the abstraction to be converted in real forms on a lower level. In the same way internal zones in buildings may be used to structure the building's deployment, but also link the design of the building to infill by future occupants.

Linking levels of intervention by means of zones is facilitated by typology. The zones used may stand for the particular type of inhabitation for which the higher level design must make space. I noted earlier that a house type usually arranges spaces, classified by size, in a specific way. (Chapters 3 and 5) This arrangement can be abstracted by generalizing their location in terms of zones. The type, in that case, is represented by a zone distribution. Kinds of spaces can be allocated to particular zones. The dimensions of zones relates to the dimensions of the spaces allocated to them. Margins can be added to a zone's boundaries to express the variation of dimensions allowed for the allocated spaces. Typically, dimensions of zones may relate to the "normal" spaces. Larger spaces may then span more than one zone. Smaller spaces may aggregate within a zone, or occupy a margin.

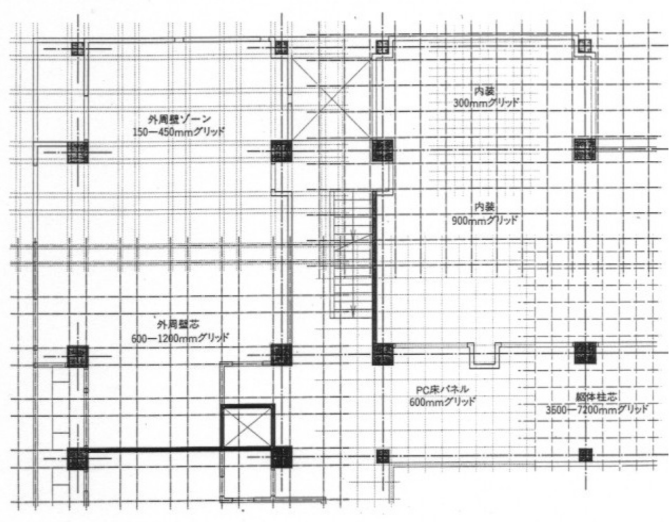
In a zone distribution, using rules of placement, a variety of instances of the type can be drawn. The zones, we may say, reflect what a set of instances may have in common in terms of spatial distribution and dimensioning. As already pointed out, this mechanism works both on the level of urban design as within the big building.

Students should be taught the use of zones. At the very least it will confront them with the issue of abstraction of fields. Exercises can be based on the fact that a building, already designed, can be abstracted by way of zones. That abstraction can be used to develop other buildings that are interpretations of the same abstraction.

Similarly an extant urban field could be abstracted by replacing buildings by zones and their allocation rules. Next these zones may be used to develop alternative urban fields. Finally such a new field may be worked out by designing buildings in it.

Exercises like these demand the capacity to generalize what is specific and to make specific what is given in a generalized way. It forces reflection on what is typical in a form and what incidental. It is an opportunity to generate a variety of instances and to learn to think in a range of solutions of a kind, rather than to be satisfied with a single instance.

Working with zones and zone distributions, the student can move from the actual form organization towards its abstraction and back to new variations of the form. Zones may be very different from the geometric solids used by renaissance architects, but the dynamics are similar. The same exercise would be applicable to a Palladian villa and its geometric abstraction. Once the geometry of squares, cubes and spheres is extracted from a specific building, it can be the basis for another interpretation.



Ten: Positioning

Lucien Kroll is regarded by some as an anarchist architect. He is known for his renovations of massive housing blocks first built in the sixties and seventies in Europe. He partially erodes these monolithic blocks to then graft onto them domestic elements like bay windows, gables, dormers, balconies, and french windows like strange weeds growing from rocks. He first gained fame, or perhaps notoriety, for his design of the student union building in Louvain La Neuve University. The facade of the building is a collage of varied elements each designed by another member of his team. Some of the masonry is the result of free improvisation by masons encouraged by the architect to exercise their creativity. Inside, dormitories have been designed by students themselves, producing spaces no architect ever dreamed of.

Few know that this idiosyncratic complexity is governed by well ordered modular principles with which the architect is thoroughly conversant. Kroll understood early on that freedom thrives on the systemic - that indeed, systems spawn complexity and variety. Not surprisingly he used the computer long before most of his colleagues did.

As I have pointed out already, geometry is no longer appreciated today as an abstraction of the architectural form but tends to become this form itself. Consequently, grids have become confounded with architectural shapes, giving both architecture and themselves a bad name.

But the purpose of modular grids is not to make grid-like forms. As Kroll demonstrates, the modular grid is a tool for positioning building parts and communicating their position in an efficient manner. The grid as such has no influence on the form it serves. After all, we do not expect the coordinates used to map the earth to be visible in the waves of the ocean, nor would we expect coastlines, mountain ridges, rivers and ships to follow those grid lines. Yet we can determine without error where all these objects are located on the earth's surface and what distance they are from one another.

In the past, spatial coherence among parts in the composition of buildings was related to the size of common elements. North Western European architecture was measured by the size of the brick. All dimensions of windows, doors, walls and buttresses were expressed in 'headers' derived from the short side of the brick. Japan, of course, knew the tatami as the unit of design. In North American balloon frame building the distance between studs served as a module: three of them to fit in four feet; the latter being the size of sheetrock and plywood sheets.

We know that dimensions of building parts were never exact multiples of either bricks or tatami, or center to center distances between posts. Bricks have mortar joints and therefore a header is a brick width plus a joint, and physical sizes derived from the header are plus or minus joints. Likewise tatami floors are separated by walls and wall thickness is to be either added to or subtracted from the multiple of tatami to arrive at a true size of a space or a wall.

The point is that traditional building practice userd sophisticated systems of dimensioning, understood by all parties involved. Their value was not in standardization of parts - tatami may vary in exact dimension from region to region, bricks of all sizes are available - but in efficiency of communication among parties. When the carpenter was told what size brick was used and how many headers the window size was to be, he could make a window that would fit. Vernacular dimensional language was a thematic device to coordinate work by the trades.

Today's pluriform environment does not allow a single product like a brick to support all communication in the field. The building is now a composition of systems, each with their own modular principles. Different buildings may contain different systems and materials. We need new means to keep track of the distribution of parts in space and of their dimensional interdependence. Grids help us do this. They serve to locate parts in space and to determine how shifting of one part may affect the size of another.

Hence, positioning objects in space is the purpose of grids. Dimension follows from where things are. Positioning of parts relative to grid lines can be subjected to rules (for instance centered on a grid line, or between two lines). Each system may have its own positioning rules, determining how the relations of parts will be. Knowing position rules of two systems, we know how these systems may relate. With the help of grids, traffic of parts in space can be organized. In fact, for a single project, more than one grid may be used. Starting from a basic grid, other grids, serving their own systems, may have modules derived from the base grid module by multiplication or subdivision.

Interrelated grids may operate on different levels of intervention. A building's structure, for instance, may be based on a module of five feet, while a single foot is best for the deployment of partitioning and other fit-out subsystems. In urban design, on the other hand, modules of ten or twenty feet may be in order.

But even on a single level we must coordinate a variety of subsystems and each may have its own positioning rules for deployment. In the design of an infill system I was involved with in the 1990's, up to twenty different subsystems account for all the parts, conduits, and utilities that come with it. We used a basic grid of 10cm with a derived band grid of ten and twenty centimeter bands. Positioning rules of all subsystems in question were related to the band grid and thereby organize the whole in what proved to be an intuitively simple way. People who do not know how to explain the grid's principles nevertheless work with them correctly and without trouble.

Using position rules for building parts in space is not unlike using a beat in music. It gives a base for modulation. The grid may be rigid and repetitive like a single beat, but positioning rules may allow for a variety of placements of the same part and we are always free to ignore rules or to deviate from them for the sake of the overall composition. Even a deviation is a known position in the grid. In this way the grid becomes a design tool; not a form, but a means for making form.

To serve the infill system referred to above, we developed software by which the computer understands position rules. We can tell it what grids we want to use. We can determine for each material part what position rules apply to it. We do not have to elaborately position elements ourselves, but may just click in the general location where the part must come and the computer places it accurately. A change of position rule will make the computer change all instances of the part that are already in place.

CAD systems that can be told what grids to use and what position rules apply for what parts can be efficient position managers. Good position management principles not only allow the use of computers, they also make design decisions more transparent, make dimensional calculations easier, and reduce the risk for errors in technical implementation. Yet today's CAD programs are poor position managers. The reason is not with the computer, but with the lack of position management knowledge within a profession averse of thematic discipline.

This is regrettable because truly grid-wise CAD systems would not only be good position managers but could also support coordination among designers. When the computer knows the position of each part, it can also know who designed each part. Hence it can tell us if there is a conflict between design responsibilities. It will note, for instance, a duct planned by the ventilation consultant crossing a column designed by the structural engineer, and leave a message informing both parties. Judicious use of this ability can make the computer program a mediator between designers.

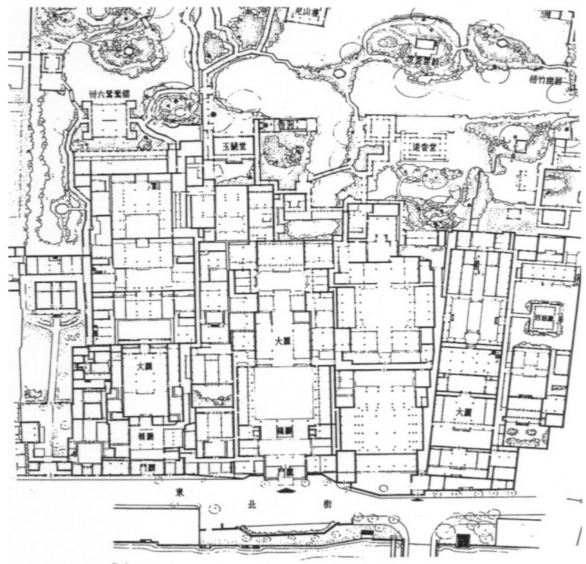
Use of the computer in support of design coordination need not be argued, given the number of technical systems in any given building, controlled by a variety of consultant designers, each with partial design responsibility. In building projects, most of the time spent on making drawings is time spent on checking the consequences of changes, themselves often minor, reverberating through the many sub systems in the building. When taught how to discriminate systems and their position rules, computers will have no trouble doing such checking.

Management of data pertaining to all parts in a building is the key to future computer aided design. Not drawing, but data management, will become the essence of CAD systems. CAD programs will increasingly become data bases telling us where parts are, what system they belong to, and what designer controls them. When the program is driven by a database, visual representation in plan, section, elevation, or 3D view is no more than a particular way to report on available data. But to make programmers do this kind of software, they must be explained the principles of grid use and positioning of parts in them. This knowledge must come from the design profession.

Education software should, ideally, be capable of coordinating work among designers, offering students experiences otherwise not possible in school. In a previous chapter I suggested students be given teaching libraries and thematic systems set up by faculty to work with. These systems may come with grids and position rules, making their manipulation quick and efficient. Deployments will be shown in 3D, section, or plan, all representations to be extracted from a central database that is the heart of the CAD program. Because the database gives access to all information pertaining to a single part, parts can be selected along criteria of material properties, price, availability, and agents in control of them.

With a program like that, two or more students can exercise coordinated control within a single configuration. Each may design her own part of the whole, experiencing real world problems of design coordination. Such computerized exercises allow learning with a minimum of labor. Students must make decisions while the computer does most else.

These kinds of computerized settings easily lend themselves to game-like situations, involving two or more players. The forms they make need not be realistic but can be abstract and simplified, as long as a player manipulating them learns skills applicable in the real world. Sim City teaches us to see fields as driven by economics and politics. We need computer games that show the field as a thematic form. Advanced students, of course, may soon invent their own games by making their own programs, setting them up with grids and position rules. Making a game for others to play with is an excellent way to learn.



Teaching Thematics

Not long ago a number of internationally known architects were invited to submit proposals for a high-tech research and business settlement on Mallorca island. The Balearic government wished to provide a strategically located home base, in the center of the Western Mediterranean, for small companies, researchers and consultants, operating internationally. The brief called for a merging of residence and work space. It was assumed that entrepreneurs and researchers, attracted by the location, would adopt a lifestyle combining working and living in the same place, while being connected to worldwide electronic networks for communication. They would live in a high-tech environment, using fax machines, telephones, computers, and satellites.

In response to that brief, Elias Torres submitted an exact copy of an already existing village of the island, which he relocated on the designated site. He implied there was nothing in the program that could not be done in the traditional vernacular field with its narrow winding streets, well protected against sun and wind, and the generous houses with their courtyards; the whole well attuned to the sensitive ecology of the island.

Torres' gesture, made only partly tongue in cheek, effectively ridiculed the persistent modernist habit of assuming that any program or brief must be met with a newly invented form. He made room for the idea that human settlement consists of universals in placemaking and spatial order. I took his proposal as a reminder that the true challenge was to find suitable thematic deployments. Local vernacular architecture had already set a standard and would be a logical point of departure for that search.

Needless to say, the discussion among jury and contestants was cast in the traditional mold: although ecological issues were deemed important, the issue was to find 'new' forms responding to 'new' programs. There was no vocabulary available to adequately address questions of thematic transformation. We are still far removed from the point where thematics may inform the way we discuss designing but, forever hopeful, I like to think Torres' intervention revealed an emerging recognition of thematics.

I have argued that, when engaging the field, we join in patterns of cooperation. A system makes us share knowledge and method in a social body. Patterns allow us to find common ground with clients and users. Types give us context for interdisciplinary coordination. Levels help us to maintain a hierarchy of intervention among colleagues. These connections are the threads with which the fabric of professionalism is woven, a source of knowledge, and an inspiration for the making of form.

Once common ground is accepted as nourishing, common methods and skills appear. I have given examples of tools supporting them: capacity analysis to connect form to use, a geometry of zones to abstract and generalize forms in the field, position rules in grids to manipulate complex combinations of systems, databases to drive computer aided design.

Professional education that accepts thematic knowledge as the basis for architectural design, must utilize the tools and methods compatible with it. Indeed, when we develop thematic tools ourselves, build thematic knowledge, and teach thematic skills, we make school the innovator for the profession rather than its kibitzer.

Faculty who want to teach thematics will find that none of the aspects discussed in the previous chapters will fit easily, if at all, in the present studio format. With its first cousin, the workshop, studio is the only format we have to teach designing. New ways of teaching must be invented.

By nature, the studio is a competitive environment where the student is always looking over his shoulder to his peers. He is not asked what he shares with them but must show he is different. Studio work is highly product driven. In the end, the student is not asked what he has learned, nor what skills he has mastered, but what design he has produced. The design will be judged by outsiders who must, necessarily, disregard methodological explanation. Only the result counts.

This, in itself, is alright. The studio is a place where the student learns to articulate her own values and to assert her own position, must demonstrate capability to synthesize a form in a given context and show ability to defend her proposals for an audience of critics. All that is important to learn. There is indeed nothing there that would disallow the application of thematic skills if those would already be possessed by the student and recognized by the teacher. These skills themselves, however, the studio will not provide.

Separate exercises to acquire thematic skills take valuable time and therefore increase the risk of an incomplete product when done in studio. Indeed, students tend to become impatient when asked to acquire new skills in studio, for good reasons. Compared with the musician's education we may say that the studio is a class in composition and therefore not the place for doing scales, or mastering 'etudes', nor for just enjoying the playing of music.

Workshops are good places to study and transform a field. For that particular purpose they are superior to studios. The desire to come to a collective result reduces the pressure on individuals, but what is produced still must serve, perhaps partially, in student's portfolios.

When a field is studied in a workshop, an abundance of morphological, demographic, legal, and functional information is usually made available, but there is a poverty of methods and a lack of discipline where the actual manipulation of physical form is concerned. Patterns, types, systems, and levels are ill defined if used and often not used at all. Workshops tend to be long on the exposition of opinion and ideas but short on the formal projection of alternatives and their analysis on which opinion can be based and with which ideas can be justified. Here too, the use of thematic skills and methods would benefit the workshop, but there is no reason to believe they can readily be taught there.

Exercises in skills and methods are best separated from a discussion of values. Their subject is the manipulation of form. Attention should be paid to the logic apparent in processes of transformation. Inquiry must be directed as to what can be done and where action may lead to, rather than to what we desire and where we want to go. It is the latter questions that must dominate studio work.

I have found that students readily accept the idea of a well constrained exercise in designing done, for instance, as a homework assignment, once it is explained that the purpose is for them to acquire control of (complex) form. They always find room for personal preference. There is something very satisfactory in seeing how a well completed task bears one's personal mark although that was not the purpose.

It is more satisfactory to find that self expression is the inevitable result of designing, no matter how constrained the task, than to become frustrated while deliberately seeking self expression, as is so often the case in studio. Handicapped by a lack of skill in form making, the student, keen on doing her own, feels something better could be done if she only knew what it was. In designing, we only really know what we can also do.

Needless to say that the teacher of a skills course - asking students to manipulate patterns, systems, and types, to evaluate the capacity of spaces, and use the interaction of levels - must judge the assignments on the merits suggested by the task only. Is there clarity, is it complete, is the sequence of transformations or variations reasonably structured? Preference of form is not a topic, but the limits and potential of tools are. The central question is how, not why things may be done.

Some of the topics suggested in the previous chapters may fit in a studio format. Making, for instance, an institutional or commercial program inhabit a cluster of historic houses is a task that technically has no conflict with a studio setting. (as described in item two.) It is a real life kind of problem and not an easy one at that.

But that kind of studio task, to be done with some freedom and pleasure, requires the application of thematic skills and knowledge. Without them the work soon becomes laborious and may seem overly constrained. For a task like that, it would greatly help if the student knew how to make a capacity study to evaluate higher level structure and anticipate lower level form, (chapter eight) and would understand the implied level distinctions and the relations between the levels involved (chapter seven). Then there is the issue of typology (chapter five). Studying the type of the historic house demands identification of its spatial system, its facade system, and the way it is built, all of which, in turn, would require ability to identify systems and explore their potential (chapter three).

If such skills and their related knowledge base would already be familiar to students, the discussion of the problem at hand would not only be much easier and more fluid, but could focus better on the actual studio task: on the values implied, the judgment calls to be made, and the choice of possible routes of transformation to be followed to arrive at the desired environment.

Conversely, when students do not have the required thematic skills, it is difficult and unrewarding for them and their teacher, to deal in studio with re-use of buildings. For the same reasons it is not attractive to do certain new buildings: apartment buildings, office buildings, hospitals, shopping malls, airports, or suburban neighborhoods or any other large everyday environment that requires the manipulation of thematic form and the cooperation among designers operating on different levels. We know we cannot teach on the fly what is needed to tackle these subjects without seriously eroding the studio purpose. Neither does the studio allow the team work needed for these kinds of tasks, although the workshop may.

Colleagues in the Department of Architecture at MIT may protest that subject matter I am advocating is already dealt with by them in studio's and workshops. Fair enough, the MIT department has always paid attention to the everyday environment. We may have gone as far as can reasonably be expected in stretching the studio format and in experimenting with workshops without explicitly addressing thematics.

For this reason, however, the limitations of the traditional teaching format have become clear for quite some time. The next step must now be taken by creating well defined settings in support of the study of thematic knowledge and the exercise of thematic skills liberating, at the same time, the studio format to do what it can do best.

At MIT the infrastructure available for computer based education should be prepared for thematic inquiry and designing. By itself, the computer does not provide a new way of teaching, but can be a catalyst in the search for it. Instead of being forced onto a reluctant studio format, or being applied to make architecture look glamorous, the computer should be employed where it is truly needed: the teaching of those skills and methods the studio cannot provide, and which must therefore be taught separately. In time, when students will take those skills with them, the computer will enter the studio in a natural way.

The task implied is extensive. Teaching libraries of parametric parts must be set up. Drawing from those libraries, systems must be created with which the control of complex forms can be taught and studies in typological qualities can be conducted. Capacity libraries should be made available for easy reference. Last but not least, database driven CAD programs capable of sophisticated parts management should be developed.

With the support of such programs, students will not be required to spend long hours feeding basic information into ignorant computers or laboriously creating objects that can easily be drawn by hand. They will have at their disposal sophisticated machines that challenge their talents, their judgment, and their intelligence.

As I have argued earlier, teaching libraries of parts and details need not be copies of professional libraries, nor need professional databases be employed for educational purposes. The dynamics and intricacies of interaction, choice, judgment, and cooperation are constants in the design process and must be taught. Parts and systems used may vary from office to office and school to school. Teaching libraries and school's data bases can be more lean, more stylized and more idiosyncratic, compared to what is needed in the professional office and may perhaps be even more advanced than what is available there.

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I have spoken of thematic qualities in the field and of tools derived from them. Accepting my specific suggestions requires a shift of perspective. The way we see architecture, and hence ourselves, is involved. My report, first of all, wants to be a contribution to that re-examination.

Architecture, when all is said and done, pursues the beauty and autonomy of built form. We must consider how that worthy quest is to be conducted. Beauty in the built environment needs to be cultivated. Thematics is where cultivation of architectural form begins. It does not guarantee good architecture, but provides a fertile soil for it.

Autonomy arises where architecture is no longer expressing its maker but touches universals. It belongs first of all to the field, which is too large, and too complex, to be the invention of a single party or the product of a single moment. The autonomy of the field governs the autonomy of architecture by lending it thematic order. Architecture's autonomy, to be sure, should not be confused with the autonomy of the architect, which does not exist. We are beholden to the field. Our work may be guided, it is hoped, by a desire for personal integrity. But we cannot demand acceptance of it for that reason only. Our task is to contribute to the field.

Those imbued with (post)modern values may find it difficult to take seriously the idea that the fate of architecture depends on the contemplation of the ordinary and the cultivation of the common. Moreover, the academic mind, trained to ask questions and mistrust convictions, may be reluctant to accept a proposed direction. Yet the latter may appreciate that, to see the way I suggest, some hard questions must be dealt with first. The former may remember how, not long ago, the avant garde took pride in pursuing what many thought was beyond the pale.