

Morphology and Design

Reconciling intellect, intuition, and ethics in the reflective practice of architecture

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Abstract

This paper starts by exploring models of knowledge in order to place architectural knowledge in relation to the forms of knowledge that have been developed by other academic disciplines within the universities. In the light of suggestions that the low esteem in which architecture is held within the universities may be due to its basis in practice and its apparent lack of a coherent body of knowledge, the proposition is made that morphology has a special place in advancing architectural knowledge because it is able to make the link between design and its social consequences. Understanding this relationship is vital if architecture is to defend its position as an art that is of general social relevance as opposed to being the domain of the socially privileged. Kolb's learning cycle is introduced as a device to track the forms of knowledge that are essential to the reflective practice of a genuinely social architecture and to relate these to the insights into morphology and design that have been provided by space syntax over the past two decades. 'Sheltered' housing for older people is taken as an example of how a morphological approach can offer an enlightened critique of design guidance that articulates the authentic experiences of the inhabitants. The creative interplay of intellect and intuition is considered in relation to how morphology can help to clarify strategic design choices early on in the design process. The importance of briefing and evaluation are also stressed as essential ingredients that will enable space syntax to turn Kolb's learning cycle into a dynamic learning process. The paper concludes by proposing an ethical framework for design.

Architectural artistry

Architects, landscape architects, interior or industrial or engineering designers make physical objects that occupy space and have plastic and visual form. In a more general sense, a designer makes an image - a representation - of something to be brought to reality, whether conceived primarily in visual, spatial, plastic terms or not. Designing in its broader sense involves complexity and synthesis. In contrast to analysts or critics, designers put things together and bring new things into being, dealing in the process with many variables and constraints, some initially known and some discovered through designing. Almost always, designers' moves have consequences other than those intended for them. Designers juggle variables, reconcile conflicting values, and manoeuvre around constraints - a process in which, although some design products may be superior to others, there are no unique right answers. (Schon, 1989, pp.41-42).

Many metaphors have been used to characterise knowledge. Knowledge has been likened to a landscape, a map, a seamless cloak, a patchwork quilt (Becher, 1989). Taxonomies of academic knowledge have drawn attention to distinctions between hard and soft subject matter, pure and applied fields and natural and artificial systems (Biglan, 1973). However, one of the

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more enduring models of knowledge and understanding is one that was initially derived from the strategies that university students adopt in order to learn (Kolb, 1981). This draws attention to two dimensions of knowledge, between abstract / concrete modes of thought

and active / reflective learning styles, and produces a four-fold typology of knowledge domains in which the design disciplines occupy the abstract-active quadrant, see Figure 1.

Unlike the arts, natural sciences and humanities, design is essentially about intervening in the world. Creative design therefore confronts its author with the greatest of intellectual challenges. Schon's (1989) influential account of the designer as a '*reflective practitioner*' and of the design process as '*reflection-in-action*' started from the premise that the fundamental condition of design is one of uncertainty, uniqueness and conflict. Good design, he pointed out, has to take account of innumerable interacting factors and the consequences of ignoring any one variable could result in a catastrophic failure. He coined the phrase '*professional artistry*' to refer to the specific competences that are cultivated by those who exercise judgement in such an indeterminate yet practical arena. For Schon, architectural artistry is the paradigm for knowledge-in-action and design is the process fundamental to the exercise of artistry in each and every profession.

Yet, according to Sir Graham Hills, compared with many other academic subjects within the modern university "design occupies a lowly place in the educational firmament because it appears to lack intellectual content," (Hills, 1994, p.87). It is not perceived to be a substantial, respectable discipline within higher education. Compared with many other university subjects, the ratio of knowledge (the know-what) to skills (the do-what) and technology (the know-how) is low for all the design disciplines and whilst knowledge is prized and valued as the acme of academic achievement, skills are less well regarded and technology commands little respect. As Hills has put it, "To be called knowledgeable is to be complemented. To be called skilled less so. To be called a technologist is a faint insult," (*ibid.*, p.89). In order to counter this culture of snobbery, elitism and prejudice Hills argues that it is imperative for the design disciplines to develop a corpus of coherent knowledge.

It was probably not a coincidence that the UK universities during the 1950s, a time when the profession appeared to 'know the answers' and when public confidence in architecture was high, finally assimilated professional architectural education. However, those who were setting the agenda for architectural education within the universities were keenly aware of the profession's lack of knowledge and of the need for a more complete theory of architecture, defining this as "the body of principles that explains and interrelates all the facts of the subject," (Broadbent, 1995, p.20). At the time it was argued that "knowledge is the raw material for design... It is not a substitute for the architectural imagination, but it is necessary for the effective exercise of imagination and skill in design". Lack of knowledge, on the other hand, "handicaps and trammels the architect, limits the achievements of even the most creative and depresses the general level," (*ibid.*, p.20). As the purpose of the universities is to advance knowledge through research, higher education seemed a natural way to further the search for a more effective theory of architecture. The intellectual tension that resulted from

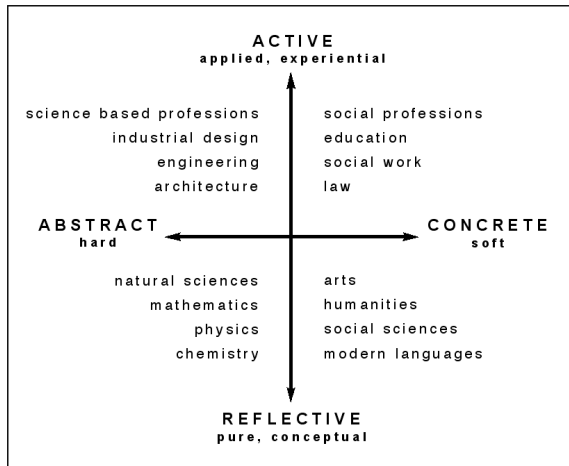


Figure 1. Domains of academic knowledge

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absorbing an intuitive, studio-based and practice-orientated design discipline like architecture into the universities, whose concepts of knowledge tended to be more reflective than active, was not resolved at that time.

This tension was to resurface many times in subsequent debates about architectural education, and was usually expressed as an opposition between "education" and "training", (Nuttgens, 1988). Describing his experiences when setting up the architecture course at the University of Edinburgh in the late 1950's, Professor Nuttgens wrote somewhat wryly that, "It was clear to me from the start that architecture in the University was not among the reputable subjects that a university usually taught. Rumour had it that the Professor of English had remarked at the Senate that if the University were going to teach architecture, it would be teaching plumbing next." He added, "In fact, as the Professor of Architecture later remarked, it does now teach plumbing, but calls it Building Science!", (Nuttgens, 1988, p.22). Initially, architecture had hoped to benefit by drawing on the bodies of knowledge that resided in other disciplines within the universities. By the early 1970s Bill Hillier (1972) had pointed out that the then-prevalent view of architecture as a 'meeting ground' for related academic disciplines such as engineering, sociology and economics was untenable and that architecture had to build its own disciplinary knowledge base.

In essence this was the task that Space Syntax set itself back in the 1970s and in attempting to represent architecture as a formal, descriptive field of knowledge the approach we adopted was both mathematical (abstract) and morphological (active). As Hillier put it,

It is hard to see how such problems [of representing fields of knowledge] will be resolved except by novel theories of combinatorial pattern formation. If mathematics is to justify its claim to be the general abstract study of pattern, such theories will be assimilated to mathematics, if they are not part of it. ...Whatever the solution, the existence of the knowledge problem in artificial intelligence research already strongly suggests that some formal order, of a more or less mathematical kind, must inhere in the complex entities which we 'recognise' so easily in everyday life. With only a minor extension of the argument, it may be suggested that this could be a key to the scientific study of those artificial systems which are defined on a collectivity, like cities, societies and languages (Hillier et al., 1978, p.344).

Morphology, the study of pattern and form, is crucial to design because it constitutes an essential part of its corpus of coherent knowledge. Great architects may well have mastered a wide repertoire of forms that they are able intuitively draw on in the exercise of their artistry, but they are not expected to talk about it. Academics are less fortunate. They are expected to demonstrate their knowledge and understanding through discourse and by the production of elegant academic papers.

The history and evolution of Space Syntax as a theory and a method was set out by Hillier (1997) in his opening address to the first Space Syntax Symposium. The aim here is to explore how space syntax can make a contribution to architectural research and design. Psychologists have established that knowledge and understanding are mediated through three distinct modes of thought. These have been described as enactive (concrete, experiential), iconic (visual, diagrammatic) and symbolic (verbal, mathematical), (Bruner et al, 1966). The forms of knowledge that are celebrated by the universities have tended to emphasise the symbolic, to the detriment of the other two modes, which is perhaps another reason why historically the design disciplines have often been portrayed as marginal within higher education. Kolb



Figure 2 (left). Kolb's learning cycle.

Figure 3. Kolb's learning cycle adapted for architectural knowledge

(1983), however, has argued that intuitive understanding is achieved through a 'natural' learning cycle that involves 'learning-by-doing'. The analogy with architecture as a reflective practice is clear and unmistakable.

Figure 2 is a representation of Kolb's learning cycle, though as each iteration builds on previous knowledge it should more properly be envisaged as a spiral, and Figure 3 adapts Kolb's learning cycle to show how the practice of architectural artistry can, in principle, be knowable. The remainder of this presentation will try to show how morphology, in the guise of space syntax, can lay the foundations for evidence-based research and also be the basis of a more reflective practice, potentially by intervening in each stage in the learning cycle. But in order to do so, we must first consider the nature and purpose of architecture.

Architecture as a craft or a vocation

Depending on one's point of view, it is possible to hold one of two completely contradictory opinions about the nature and purpose of architecture. The first sees architecture as the product of social elites, a manifestation of unequal social power, wealth and opportunities; the second would argue everyone is entitled to enjoy the benefits of a well-designed built environment. Proponents of the first view associate architecture with civilisation. It is interpreted as a record of human progress and achievement. The adjective with which it is most often associated is 'monumental'. Supporters of the alternative viewpoint today associate architecture with democracy. It is interpreted, at least for modern societies, as a general force for social good. The adjectives with which it is most often associated are 'ordinary' and 'everyday'.

The first position depicts an architectural record that is composed largely of palaces, churches, castles and tombs. As Professor Cordingley put it in his Introduction to the seventeenth edition of the all-time great classic text on architecture, Sir Banister Fletcher's *A History of Architecture on the Comparative Method* (1961),

The history of architecture is a record of continuous evolution, beginning with the simple and massive forms of Egypt and Mesopotamia, followed by the more highly developed temple-building of Greece; passing through the complex types of Imperial Rome, with her multitudinous public needs, and also through the ages of Christendom, where faith and fear reared cathedrals and castles, until the men of the Renaissance reverted to the Classic types for the varied buildings of this great period in human development. Architecture, striding down the ages, was evolved, moulded and adapted to meet the changing needs of nations in their religious, political and domestic development. A glance along the perspective of past ages reveals architecture as a lithic history of social conditions, progress and

religion, and of events which are landmarks in the history of mankind; for architecture is in all periods intimately concerned with national life, the genius of a nation is unmistakably stamped on its architectural monuments, whether they are Egyptian, Roman, mediaeval or renaissance. Throughout the history of the human race, architecture, the mother of all arts, has supplied shrines for religion, homes for the living, and monuments for the dead, (Cordingley, 1961, p.5).

For an architectural theorist of this bent, legitimate knowledge is historical and such knowledge as exists is largely craft-based rather than theoretical. As a practitioner, one's clients whoever they may be, are the 'movers and shakers' in society. However, for those of a more critical disposition, this definition would imply that architecture is inextricably bound up with inequality and social reproduction and is usually exploitative and possibly oppressive with respect to the majority of a nation's population. In this light, it is interesting to note that the most recent theoretical contribution to the study of building types (Marcus, 1993) preferred to talk about buildings and power.

The alternative position regards the profession of architecture as a vocation at least as much as it is a way of making a living. This position was particularly pronounced in the UK in the immediate aftermath of WWII, when an entire generation of young British architects set themselves the 'heroic' task of finding an appropriate repertoire of new architectural forms for the emerging welfare state. Throughout the third quarter of the last century, about half of all UK architecture graduates found a career within the public sector and most students were committed to a genuinely public architecture. These social aspirations subsequently have been interpreted as either on the whole progressive (Teymur, 1992) or as totally catastrophic (Crimson and Lubbock, 1994), depending on the author's view of modern architecture and the architectural profession today.

The Smithsons (1970) were later to write of this period

Architecture is concerned with finding the pattern of building and communications which make the community function, and, at the same time, give it meaning. To make a community comprehensible to itself - to give it identity - is also the work of the politician and the poet, but it is the work of the architect to make it visible. ... The responsibility of architects working in countries of great social change for directing the culture potential is very great, and it is mostly being evaded, (A. and P. Smithson, 1970, pp. 166-167).

The patterns they sought to capture were not those of an imposed, centralised architecture of state control but a spontaneous and direct expression of the collective aspirations of ordinary men and women.

"We have to try to re-identify man with his environment - to arrive at an idea of a city in which every building, every lamp post and street sign will seem part of a predestined harmony of which man is part. All else is futile," (*ibid.*, p.38). In order to be equal to the task, they also recommended that "the first principle of town development should be continuous objective analysis of the human structure and its change," (*ibid.*, p.123).

It is unfortunate for those of us who subscribe to the view of architecture primarily as a "social art" (Hillier and Hanson, 1984, p.2) that public sector architecture in many parts of the world is inextricably bound up with building failure, most notably with a legacy of unsatisfactory social housing. The credibility gap between what the architectural profession offered

and what it eventually delivered probably has never been wider than in its attempts to redefine contemporary ways of living in ordinary family housing and in homes for people with 'special needs', such as frail older people, who are deemed to need extra support through social housing. Within the UK, the attempt to engineer more egalitarian, utopian forms of housing in order to achieve 'community by design', has given architecture such a bad name that responsibility for the provision of social housing has been removed from the architects' departments of the local authorities and placed in the hands of national and local housing associations. However, the failure was not in intent but one of knowledge.

With the benefit of hindsight, the passion and fervour of this immediate post-war generation of architects seems naïve, idealistic and misplaced, patronising even, but it inspired in many of the ensuing generations of architectural practitioners, researchers and educators a deeply-held and abiding sense of social responsibility. Indeed, it was largely out of the attempt to understand the relation between architectural experimentation and social breakdown that seemed to have occurred on many post-war housing estates that space syntax itself was born, (Hanson, 2000). We were later to write in the Preface to the *Social Logic of Space*, "It has become clear that a lack of understanding of the precise nature of the relation between spatial organisation (morphology) and social life is the chief obstacle to better design," (Hillier and Hanson, 1984, p.x). Within the 'space syntax' community it is generally assumed that architectural knowledge, whether explicit or implicit, is high in social content. This implies that that the relation between morphology and design passes through society and that the most important contribution that morphology has to offer to design is in clarifying the relation between architecture and society.

Today, we rarely speak explicitly about monumental architecture and people have come to expect that architecture will deliver enjoyment and pleasure, that it may provoke or shock, but not that it should inspire or awe. Some pundits even believe that the ultimate purpose of architecture is to make a fashion statement. The public have become the recipients of a plethora of hedonistic, high profile buildings for culture and leisure that have been stimulated by Lottery funding and the perceived need to mark the millennium. These are buildings that celebrate the visitor, the tourist, the nomad. Yet no amount of 'spin' can disguise that fact that, though promoted as popular culture, most of these projects stand as powerful monuments to political ambition. Their impact on most people's everyday existence is minimal. The message may appear transient and ephemeral but insofar as it perpetuates power inequalities, much of today's public architecture is every bit as monumental as that of previous eras.

In this light, the apparent recent tendency within architectural education to play down students' social and political awareness in favour of a more eclectic, fragmentary approach (Pearce and Toy, 1995) that seems to treat architecture as an offshoot of cultural and media studies, whilst understandable, is nonetheless disturbing. So is the fact that many of today's fashionable young practitioners tend to be coy about the social aspects of their buildings and seem anxious to deflect public attention and debate towards aesthetics, structural and constructional integrity and environmental sustainability; that is, towards the materiality, craft and fabrication of architecture. So far as knowledge and design are concerned, within some parts of the profession we seem to be experiencing what amounts almost to a collective denial of architecture's social relevance. It is perhaps ironic that this has occurred just at the moment when the social sciences have finally discovered the significance and power of space.

The purpose of pointing out these two contending points of view here is therefore not in order to settle the debate between monumental architecture and the architecture of the everyday, so much as to consider the consequences for morphology and design of seeing architecture as a practice that has high social utility; in effect, adopting the second point of view. The first is that this defines the client as the ordinary users of buildings at least as much as the organisations that commission and pay for them. It also suggests that the ordinary, everyday buildings like schools, shops, health centres and factories and people's homes, the types of buildings that inform most people's experience of architecture, should be designed as carefully, sensitively and joyfully as prestigious projects like museums and art galleries. The second is that it becomes incumbent to engage in evidence-based research. The third and ultimately the most far-reaching outcome is that it establishes an obligation to develop an ethical framework for design.

Precedents, claims and practices

Most practising architects do not design high profile projects that attract media attention. Architecture is largely practised as a small-scale profession by practitioners who work alone or with one or two colleagues to deliver a design service to the public at large. It is here, and not in the architectural journals or the fashionable discourse of the design schools, that many architects still fulfil their vocation. It was in one such small, provincial practice that I began my architectural career, some thirty years ago. The first major project for which I took sole responsibility from design to completion was a 'sheltered' housing scheme for older people. The design took the form of a U-shaped, two storey building that comprised forty-eight rented flats for old age pensioners on low incomes. The flats, mainly bed sitting rooms, were ranged around a central courtyard and linked together by an internal corridor. At the centre of the U-shaped block on the ground floor there was a residents' lounge and dining room and on the first floor there was a flat for a warden, whose job was to act as a 'good neighbour' to the elderly residents by providing help in an emergency. The design was unexceptional. Indeed, it exemplified what we now know to have become the most widespread and popular built-form stereotype for sheltered housing in the UK.

In the early 1970s, this was a new type of social housing for which there were few precedents. In common with most architectural projects, the design had to balance the many competing constraints that were enshrined in legislation, space standards, construction, services, the site and above all the budget for the scheme. Like most young practitioners, I had little personal contact with older people beyond the members of my immediate family. The social stereotypes of older people that were current at the time were, by and large, unflattering. They painted a portrait of old age as a condition of poverty, dependency, disengagement, ill health, frailty, senility and general decline. The main, indeed the only source for design guidance, was provided by central government (DoE, 1968a, 1968b). This guidance, together with a small number of published examples of award-winning schemes, formed the knowledge base for the design of sheltered housing. No one thought of consulting older people themselves about where and how they would like to live.

Today things have changed for the better in this respect at least, and for the past two years I have been researching the home life of older people in order to profile the UK's housing stock with the needs of older people in mind, (Hanson, 2001). Three fifths of the housing I have studied has been 'sheltered' housing, so that I have had to opportunity to revisit in some detail the design ideas that informed that early housing project. A major innovation of

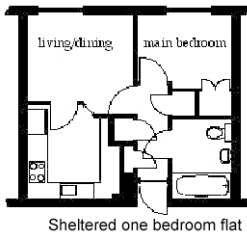
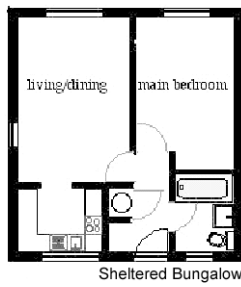


Figure 4. Typical examples of sheltered housing units.

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this research, compared to previous research that has addressed the housing needs of older people, has been the intention to develop a way of classifying the housing stock that took into account the experiences of older householders. To this end, the study included a detailed ethnography of the home lives of sixty older people, living in a wide range of house types and tenures. A fundamental aim of the research was to be responsive to the voices of older informants as they described their ideas and aspirations about the kind of housing and support they preferred, and to voice the views of older householders directly to designers by articulating their concerns in a way that could influence housing policy and best practice.

As the examples in Figure 4 illustrate, sheltered housing is very different in its plan form and internal layout from ordinary family homes. A morphological analysis makes this clear. Despite the differences in built form between the three illustrative examples shown here, the accommodation is small and the layouts are stereotyped. All the plans combine living with dining, and the living room is also connected directly to the kitchen. This is standard practice throughout the sheltered housing sector. There is no space to entertain or for overnight guests, so offering hospitality becomes more difficult. In many ways, the homes offered to older people do not comply with everyone's conception of a normal family home. This is nothing less than an invidious but pernicious form of stigmatisation.

Older people tend to have accumulated many possessions over the course of their lives and seem to be living with 'clutter'. Their room inventories are therefore much more extensive than those used by architects when designing social housing. Yet the average living room in sheltered housing units is so small that it cannot take the furniture arrangements found in normal family homes. When they first move into sheltered housing, older people are therefore obliged to dispose of their family furniture and buy new, smaller items that fit into the space. They often experience a compression of their belongings into a home that is decidedly smaller than their previous residence. Architects tend to make assumptions about how people should organise their furniture rationally to fit into their living room, but we found that many older people seem to ignore these functionalist principles and dispose their furniture in ways that suit their particular lifestyles.

In arranging the living room furniture, older people tend to adopt one of two strategies; a centrifugal tendency that pushes all the furniture to the wall and leaves the centre of the room clear for circulation, or a sequenced approach that creates a series of sub-spaces within the room. Despite the lack of space in their living room, many older people had built spatial sequences three or four steps deep into the room. Usually, these were zoned so as to create a 'privacy gradient' from more social and integrated threshold and sitting areas to more intimate, segregated spaces where they slept or watched the TV. However, few if any used 'designerly' principles to orientate the room or to arrange their furniture and possessions.

Some older people who are living in sheltered housing are all too aware of the way in which the design of their home diminishes and demeans them. As one informant explained, "In other words you're put into a section where you're over sixty and the housing that you are offered is small. Now if you're going to be put in a little cell or a tiny flat for the rest of your life, in my mind that is going to bring stress and trauma to a lot of people." Another informant spoke bitterly of the assumptions that she believes lie behind the whole concept of sheltered housing; "I wonder why it is that they [the designers of housing for older people] think because you are older you only need enough space to stand up, lie down and sit to eat. That's the impression it gives me. As long as you can sit down somewhere, you can

lie down somewhere else and sit down to eat, you don't need anything else. And therefore the space is very confined, very small. The ceilings are low, the rooms are small, the kitchen, you couldn't swing a cat around it. Because you don't cook any more, do you? And you never entertain. So what do you want a kitchen for? You know, that's the thinking behind it." People with disabilities have expressed similar views. All too often people were resigned to the fact that this way of thinking about life in old age is inevitable, but it is not always desirable.

Adequate space is a prerequisite to an older person's being able to provide a focus and a centre for family life. Of course, people who are relatively affluent can buy a more spacious home that suits their aspirations. However, space standards in ordinary family homes in social housing recognise the importance of these activities by allowing for a 'spare' room in calculating occupancy rates. Older people's sheltered housing does not, on the whole, acknowledge the importance of these activities. Yet older people themselves do and several of our informants expressed the view that the 'right' amount of space for older people was a home that has two public rooms and two bedrooms. The minimum is, perhaps, a home with three rooms that can be used interchangeably in the way that some of our respondents have illustrated, to allow for flexibility and choice in later life.

Of course no one sets out deliberately to design a disabling and stigmatising environment, a fact which merely serves to illustrate the value of a morphological approach to design. Like most practitioners, I was completely unaware of the social assumptions that underpinned my design solution, though they seem all too obvious once they have been pointed out. One simply did the best one could, given the current state of knowledge.

A generation after the first sheltered schemes were first built, conventional sociological research is now in a position to suggest that the overall built form of sheltered housing owes a debt to the architectural precedents of the workhouse and the almshouse, (Fisk, 1999). Fisk goes on to suggest that ideas about institutionalised living, ageism and paternalism have been imported into the design of sheltered housing along with the architecture. However, the extent to which the sheltered housing stereotypes encode social disadvantage in their space configuration has not hitherto been acknowledged and so the very same housing stereotypes that I first encountered thirty years ago are still in use today.

The example of sheltered housing illustrates that our understanding of how buildings and places work socially must be based on careful studies of urban or building morphology linked, on the one hand to architects' claims about how their designs are intended to be used and, on the other, to detailed studies of how they are actually being used. Frequently, it is through understanding the mismatch between claims and practices that architectural knowledge is advanced, see Figure 5.

In some areas - notably for co-presence and encounter on traditional streets and in housing estates (Hillier et al., 1987, Hillier, 1988), in urban public squares (Hillier, 1996), in buildings for health and welfare (Penn, 1993a, 1993b) and in work environments (Hillier and Penn, 1991,) - we know enough to draw together the applied research and case studies into

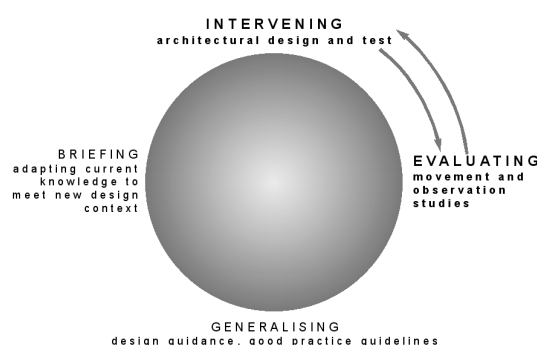


Figure 5. Learning by intervening and evaluating.

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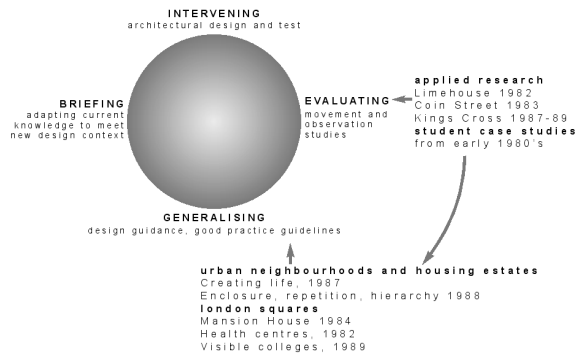


Figure 6. Active fields in the space syntax knowledge base mapped onto Kolb's learning cycle

a more general account of the mechanisms that link spatial organisation to social life. In these areas, we have begun to activate Kolb's learning cycle; that is, to build step-by-step towards a virtuous spiral of increasing knowledge, mediated by evaluation, see **Figure 6**.

However, there are still many gaps in the architectural knowledge base. One such gap is in understanding the part played by the overall form of sheltered housing and similar building complexes, in the nurturing of 'home' or the development of 'institutionalisation'. At the very centre of any *spatial* account of what is meant by home or by institution is an attribute of the setting that does not need to be explicitly acknowledged in arriving at a social account. Someone's home, be it in a room, a flat or a whole house, usually refers to one place, a distinct physical entity. Institutions usually have at least two spatial reference points, namely, some set of local constituent dwelling units, be they rooms or flats, and the overall, global building complex that is formed through the aggregation of these units, together with their shared communal features such as a residents' lounge or dining room, staff and service areas and

common circulation. Spatial accounts usually, though not invariably, attempt to describe institutions at the larger, aggregate level. The descriptions that are generated are normally geometric (Pevsner, 1976, Peace et al., 1982, Robson, 1997, Morrision, 1999). A morphological approach, on the other hand, is required to solve the relationship between the parts and the whole in such a way as to account for the social functioning of the building, for it requires a generic understanding the interplay of morphology and design to make the creative leap from evaluating to generalising, in Kolb's learning cycle.

Strategic design choices in the design of a building

The term 'strategic design choices' was first coined to try to describe the way in which a designer's solution space begins to evolve along an underlying morphological trajectory at a very early stage in the design process. In the case of an urban project this might be a decision to extend and build on the existing street grid or to interrupt and distort it. In a housing project, this could be a choice between two elementary spatial gestures like enclosure or exposure; in the case of a building it might be between designing an open, fluid interior or one that is subdivided and compartmentalised. In the case of a sheltered housing scheme, it might be to integrate shared amenities with people's individual flats or to separate them.

These decisions have far-reaching morphological consequences that eventually serve to distinguish whole classes of architectural phenomena from one another, but they can be taken intuitively, without a great deal of reflection or detailed specification. Having selected a morphological trajectory, the designer can allow the consequences to emerge as the design evolves in response to site-specific, environmental, structural and programmatic constraints.

What, then, might such a field of morphological possibilities look like in the design of a building? The idea that architects intuitively make strategic design choices that guide the design of a building in ways that produce different global interface characteristics was first set out in an unpublished paper called "Spatial Choices in the Organisation of Health Centres" that was written in 1982 by John Peponis and Bill Hillier. It was based on an analysis of

twenty two health centres and was the product of research that sought to characterise and give a morphological account of how each building constructed three kinds of social interface (Hillier and Hanson, 1984, pp. 146-7):

- between doctors, nurses, therapists and receptionists and their patients , (I/V),
- among the patients whilst they were waiting to see the doctor, (V/V), and
- between the different categories of health care professionals who made up the community care team, (I/I).

Previous work had looked at how individual buildings had constructed these different kinds of relationship but this was one of the first systematic attempts to account for differences in a sample.

At the time, health centres were a relatively recent building type. Finsbury Health Centre, designed by Lubetkin and Tecton and built in 1938, was the first modern health centre in the UK but most were built during the 1960s and 1970s, as part of a drive to take public health services out of the hospitals and deliver preventative medicine and health care straight to the heart of local communities. At the time we were looking at them, they had not had time to stabilise as a building type. As with sheltered housing, architects were experimenting with different ways of organising the schedule of accommodation in the form of a building. There was no intuitive repertoire of design solutions and no consensus existed on the best way to fulfil the programmatic requirements of the brief. The design guidance on offer stressed local factors in the design such as how to design the doctors' consulting rooms and position their furniture so as to support the functional efficiency of the doctor-patient relationship.

Previous research (Cammock, 1975) had dwelt on such factors as territoriality, zoning and confidentiality. The questions that space syntax set out to answer were:

- are there underlying morphological principles that seemed to be governing the design of health centres?;
- could these help structure the designer's solution space by helping them to interpret the requirements of the brief?;
- could analysis identify any trends in the short history of the building type?

The hypothesis was that the health centre as a distinct building type could be understood as an expanded form of doctor's surgery, in which the simple doctor and patient interface (Hillier and Hanson, 1984, p.191) was bent either to emphasise the category (status) of the doctors or the control (supervision, surveillance) of patients. This elementary model could 'grow' from a local doctor-patient interface to a global health centre complex by expanding the waiting areas convexly and / or the circulation system axially. The proposition was that it could grow into one of four morphological permutations along these dimensions of local and global interface and category and control relationships. The main finding was that the cases did seem to fall into these four broad types with different morphological characteristics. The morphological characteristics of the four types of health centre can be summarised as follows, **Figure 7**.

In the first case, the morphological principles are of grouping the different categories of users together, providing differential access and introducing distance between them. In the second, the status of doctors is given by their specialism, not space, and greater emphasis is

Figure 7. Morphological characteristics of different types of health centres.

<p>1. Global Category</p> <ul style="list-style-type: none"> • deep and ringy space structure • patients grouped in one waiting space (synchronised globally) • doctors grouped together on one corridor that is also the main circulation route • doctors have their own entrance to reach their surgeries independently • they can also interact with one another without meeting the patients • relationship of doctors' rooms to patients' waiting is indirect, i.e., chicaned, with at least 3 axial steps to construct the interface between doctors' surgeries and patients' waiting area 	<p>2. Global Control</p> <ul style="list-style-type: none"> • Shallow and tree-like space structure • patients grouped in several waiting area • these are in open spaces off the circulation • doctors' rooms open onto the same corridor • this runs through the waiting area with chicanes or distancing effects, less than 3 axial steps separate doctors' surgeries from patients' waiting area • doctors use the same circulation route to reach patients and do not have an independent access
<p>3. Local Category</p> <ul style="list-style-type: none"> • repetition of identical parts • each doctor has a separate suite of rooms, including waiting, consultation, examination and lobby • doctors on several axial lines • doctors deeper than patients with respect to the main circulation corridor • doctors each have a local ring through the examination room • doctors also have a separate entrance 	<p>4. Local Control</p> <ul style="list-style-type: none"> • separate waiting areas for patients, one for each GP • each is separately linked to a corridor connected to the doctors' rooms • corridors connecting the doctors to waiting rooms run into but not through waiting areas • no chicane effect is present, but doctors have an independent entrance at the end of the corridor

given to using peripatetic movement by doctors and other staff to supervise patients (and that among patients to supervise one another). In the third type, each doctor/patient interface is constructed separately and repeated in an identical form. The main circulation route does not play a part in structuring the doctor / patient interface but merely serves to integrate the building under the same roof. In the fourth and final type, the lack of spatial distancing combined with the subdivision of waiting areas, splits patients up but keeps them under the direct control of doctors and other staff as they move about the building.

This paper was the first articulation of a more complex theory of interface types at a level of complexity and wholeness that is equivalent to our current understanding of urban form or the problems that have beset the design of social housing. It post-dates the distinction between 'normal' and 'reversed' buildings (Hillier and Hanson, 1984, pp. 183-197) but pre-dates the binary distinctions between 'shallow core' and 'deep core' buildings (Hillier, 1996, Orhun et al, 1996) and 'generative' and 'reproductive' buildings (Hillier and Penn, 1991).

Recent work on the design of sheltered housing for older people (Hanson, 2001, Owaki, 2000) has unveiled similar tendencies in the design and layout of these facilities. In the case of sheltered housing, the older people's flats are formally analogous to the doctors' surgeries and the communal areas to the waiting areas of health centres, the warden's office is the counterpart of the reception space and the corridors play a similar role in relating the disparate parts of the building together. As with health centres, different strategies for organising the building emerge out of the way in which these functions are related together. The design choices emphasise different strategies for inhabitant autonomy or staff surveillance and control and in so doing, they would appear to encode different modes of institutionalisation. But whilst these ideas are undoubtedly suggestive, compared with our understanding of urban form our knowledge about strategic design choices in complex buildings remains relatively undeveloped.

Intervening in the virtuous spiral

One of the most important developments in the recent history of space syntax that created a very obvious link between morphology and design was the setting up of Space Syntax Ltd in 1989. This was followed in 1995 by the establishment of the Space Syntax Laboratory to carry out applied research and consultancy. This gave rise to conditions in which space syntax could be tested in the real world, through a process of intervention on the basis of modelling and prediction, followed by evaluation, an absolutely essential step on the way to creating a Kolb-type virtuous spiral.

Hillier has described elsewhere the process, which was road tested on the master-planning of Kings Cross in association with Norman Foster Associates. He later wrote,

The first step was to study the spatial structure, space use, and movement patterns in the existing contextual area... Form a design point of view, the key product of the study is a spatial model of the contextual area of the site, verified by its power to 'post-dict' the existing pattern of movement around the site. This allows us to add design proposals to the model, and to re-analyse it in order to see how each proposal is likely to work within, and affect, the urban context. We can therefore begin to explore intuitions as to what kind of a master plan will most successfully adapt the existing structure of the area and create the levels of natural pedestrian movement requested by the designers, (Hillier, 1993, p.19).

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This article went on to show how space syntax could be used as a design tool to simulate and experiment with different urban conditions to explore the limits of design possibility for the site. An essential ingredient of developing space syntax into a design tool was to turn the numerical and statistical distributions of integration values and observed people into visual representations that could be grasped and manipulated intuitively. Turning syntax from an abstract, morphological and a mathematical account into a "graphical knowledge interface;" that is, "a graphically manipulable representation that also accesses contextual knowledge and precedent databases relevant to both the spatial structure and functional outcomes of designs," (Hillier, 1993, p. 22) accessed the theoretical knowledge that space syntax represented in a way that could be brought within the scope of architectural intuition.

What we were beginning to develop in the late 1980s was a process that is completely continuous with an architect's previous experience of designing by manipulating what Schon has called the "virtual world of the drawing," (Schon, 1989, p.77). A vital ingredient of architectural artistry is the ability to grasp complex visual patterns and to see through the graphic language to the actual conditions that exist in the real situation. Hence, a competent architect is able to move in a drawing as though her were moving through a building. However, as Schon has pointed out, "the virtual world of the drawing can function reliably as a context for experiment only insofar as the results of experiment can be transferred to the built world. The validity of the transfer depends on the fidelity with which the drawn world represents the built one.," (*ibid.*, p.77). The contribution that space syntax was able to bring to the design process was therefore that for the first time, the architect could reliably test his intuitions about animating his buildings or creating life in an urban area. As Hillier has put it, "Syntactic theories are architectural not only in the sense that they are about architecture, but also in the sense that they are in the language of architecture," (Hillier, 1993, p.22).

We can now look back at over a decade of participation in architectural, mainly urban, projects, (Major, M., Stonor, T. and Penn, A., 1998). Where, then, does this leave us in relation to Kolb's learning cycle? Are we yet in a position to say that the natural learning cycle

is now complete and that we have secured at least a part of the knowledge base for architecture? The answer has to be, "not quite." For Kolb's learning cycle to come into effect, two conditions need to be satisfied. First, knowledge needs to have been deposited at all four points on the cycle. Second, the cycle has directionality and all the arrows need to point in the same, clockwise direction for the spiral of accumulating knowledge to come into being. As we can see from Figure 8, these two conditions have yet to be satisfied. The transfer of knowledge from good practice into briefing does not routinely take place at the inception of a project, so that the link between good practice and implementation is made only where the Laboratory is directly involved in the design process. More crucially, there has been little systematic monitoring of the effects of interventions where space syntax has played a leading role in shaping the design.

The situation where "we have building sciences but no science of buildings" (Hillier B and Penn, A., 1994, p.333) has been steadily improving in recent years, but strong links have yet to be shown between the pre-occupancy, spatial modelling of a building or urban area, prediction of building performance at the design stage and post occupancy evaluation of the building's subsequent social functioning.

Of course, all this is possible in theory. As Hillier and Penn pointed out in the same article, "In the first (social housing) case, we integrate from community consultation, through local authority planning and housing management to design and build. At the same time we provide a tool for long term monitoring so that as time goes on the effects of successive changes can be continuously reviewed. A virtuous circle than then be established in local authority housing design and management," (*ibid.*, p.363). Likewise, in the case of buildings, "We again integrate knowledge of the product and its functioning to link between occupancy and organisational studies, health studies, environmental monitoring and systems of evaluation through to design guidance. Again, we leave a tool for the facilities manager to monitor the progress of the organisation in terms of how it is getting on with its building," (*ibid.*, p.363).

In practice, this might prove to be quite difficult to achieve for although the computer might hold the key to organising the disparate bodies of knowledge that intelligent building modelling requires in terms of the common ground of its spatial morphology, the interpretation of that information requires spatial understanding. This replicates for the next generation of facilities managers, the selfsame problem that Schon described earlier for the novice designer. To use the tool to evaluate the 'syntactic' moves that had been made at the design stage, a planner or facilities manager would need to have internalised the theory of space syntax, simply in order to recognise its effects. Interpretation is something that many post-graduate architecture students find quite challenging even after a year of full time study. Unlike design, evaluation cannot rely on intuition. It has to be based explicitly on theory.

The architecture of the ordinary

One area where in theory it ought to be relatively easy to set Kolb's learning cycle spinning into a virtuous spiral of knowledge is in the design of people's homes. Numerous syntactic accounts exist of the houses that ordinary people build or buy and furnish for themselves and also about what tends to happen when architects intervene in the housing process, (Elgohary and Hanson, 1997, Monteiro, 1997). In practice, though, has proved rather prob-

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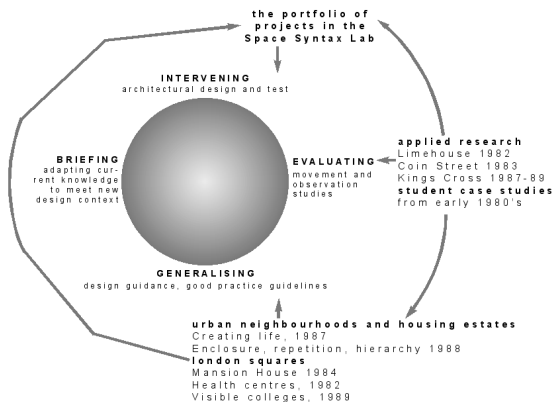


Figure 8. High points in the space syntax knowledge base in the year 2000 mapped onto Kolb's learning cycle

lematic. On reflection, it is probably quite unusual for a practising architect to be personally engaged in all four quarters of Kolb's learning cycle, though any architect with a serious commitment to community architecture as it is currently practised would also recognise the need to make the effort (Hamdi, N. and Goethert, R., 1997). The area where practising architects have been most lax is in post-occupancy evaluation, which puts them in a poor position to make a knowledgeable contribution to design guidance or briefing. This is an area where space syntax research is particularly strong, leaving aside the issue of evaluating its own design interventions.

Academic research generally is also strongest in the domain of evaluation. The project to evaluate the UK's housing stock for older people is already beginning to make an impact on design guidance, it is about to influence briefing and at the level of making strategic design choices we could be in a position to intervene in design projects within the next two to three years. We are already working with a major charitable housing provider to research the housing needs of their clients with a view to restructuring their portfolio of social housing. This could include the construction of demonstration projects to test and evaluate new models for social housing, which brings the prospect of activating Kolb's learning cycle as an iterative learning spiral that builds knowledge about a major building type- sheltered housing - within reach in the foreseeable future.

At the urban scale, things are even further advanced. Urban consultancy within the Space Syntax Laboratory is supported by a well-developed general theory of the city (Hillier et. al, 1993, Hillier 1996, Hillier, 1999) that has been tested many times in live projects. The missing link here is the need to evaluate more live projects that utilised space syntax at the design stage.

The more we can secure the knowledge base of architecture by building theories of architecture, including but not exclusively morphological theories, the more likely it will be that the academic discipline of architecture will be normalised within the universities. Indeed, the universities have a vital role to play in sustaining a scholarly 'space syntax' community, in conducting independent, impartial research, in building new and stronger theories and in supporting a more enlightened professional practice. The added value of a morphological approach is in its general applicability and relevance to design, particularly to those practitioners who are searching for a more genuinely democratic architecture.

Towards an ethical framework for architecture

Generally, the way forward looks promising and the space syntax community can look forward to securing a knowledge base in the near future that links morphology to design in at least a few key areas. However, one or two hurdles still need to be overcome, particularly in respect of all three of the issues that were raised earlier in this paper that result from promoting an architecture of the ordinary, in respect of:

1. defining the client as the ordinary users of buildings,
2. engaging in evidence based research, and
3. developing an ethical framework for design,

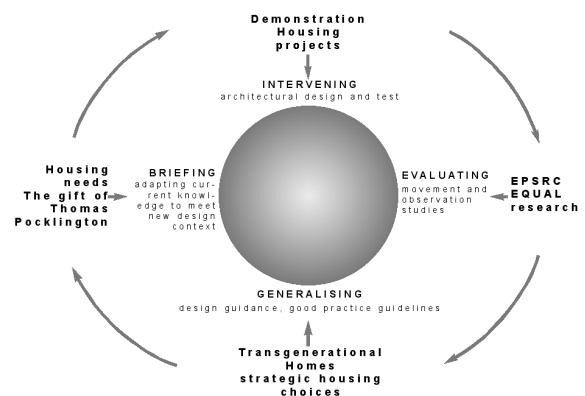


Figure 9. Kolb's learning spiral adapted for sheltered housing

and so it is perhaps apposite to raise them now, at the formative stage. All three are, in effect, inter-related and depend ultimately on a view about in whose interests knowledge should be applied.

So far as defining the client is concerned, a number of city-watchers have recently begun to express concern that the plethora of high-profile urban design projects which I referred to in the opening section of this paper, could potentially be socially divisive (Massey et. al., 1999). Massey observes that, "the point is that the daily rhythms and movements of cities routinely code and divide city space on an unequal basis that is rarely acknowledged," (*ibid*, p.160) and she then adds that spatial configurations produce effects which can either create new geographical juxtapositions or new disconnections within urban society. Could the renaissance in a new UK urban architecture simply be a manifestation of a struggle for power and resources between the socially powerful and the socially vulnerable as Massey and her colleagues imply, and if so how should space syntax respond?

The second proposition was that that it is incumbent for a socially responsible architecture to invest in evidence-based research. This raises two problems for syntax. The first is that the architectural profession does not welcome criticism. In at least two cases from the recent past where a 'syntactic' account has drawn attention to a dubious morphological design strategy and linked it to an undesirable social outcome (Hanson and Xu, 1992, de Syllas, 1989) problems arose in disseminating the results of research to a wider audience. Yet how can the profession ever hope to regain the trust of the general public unless it prepared to expose its practice to a more critical scrutiny? The second issue, also a matter of trust, is that for space syntax to be seen to be offer professional, impartial and rigorous advice, a Chinese wall may need to be constructed between those who use the knowledge base to design, that is, in intervening, and those whose main use is morphological, including using space syntax analytically to evaluate design outcomes.

The third and ultimately the most far-reaching outcome of a socially orientated practice is that it establishes the obligation for its practitioners to develop an ethical framework for design. Konceilik has argued the point thus,

Past generations of designers were able to use themselves as a measure for the devices, communications and enclosures they developed. This premise for design activity (I) will call designing for the 'self'. Simply put, this axiom is based on an assumption that 'if its good enough for me it should be good enough for other people' Today, the design professions cannot use the self as a measure of their design activity, as a premise for their judgement about wants and needs or as a starting point in the decision about what this thing should be. The young designer must understand how to design for 'others'. (Konceilik, 1998, pp. 113-114)

The more syntax is deployed to support socially disadvantaged and vulnerable groups within society, the greater the need to de-centre, if only to avoid a repetition of the disasters that resulted from the last large-scale architectural experiments, such as the invention of sheltered housing.

In arguing his corner, Konceilik also draws attention to the fact that, even in today's knowledge-rich society, many buildings and artefacts are still very much a product of the designer's intuitions. They are only evaluated afterwards by soliciting feedback from users. He describes this, rather scathingly, as "the intellectual equivalent of shoot first and ask questions

later," (*ibid*, p x). He goes on to assert that the onus upon the designer to use an information-based approach to design has now become an ethical issue for the design professions and that it should no longer be regarded a matter of individual discretion.

Like many who have gone before, Konceilik advocates that what is needed is an information-based approach to design. This, he suggests, depends on amassing sufficient knowledge about the conditions that surround the design task beforehand so as to ensure that all of life's exigencies have already been accounted for at the briefing stage. To the extent that he is right, the potential for space syntax to guide the relation between morphology and design at the briefing stage, when the limits of architectural possibility need to be set against the constraints of the unique design context, may represent its most vital contribution yet to architectural knowledge and also to present its strongest claim to be a legitimate academic discipline within the modern university.

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References.

- Becher, T., 1989, *Academic Tribes and Territories*, The Society for Research into Higher Education and the Open University Press, Buckingham.
- Biglan, A., 1973, *The characteristics of subject matter in different scientific areas*, Journal of Applied Psychology, 57, 3, pp. 195-203.
- Broadbent, G., 1995, *Architectural Education*, in Pearce M and Toy M, *Educating Architects*, Academy Editions, London, p. 20.
- Bruner, J.S., Olver, R.R. and Greenfield, P.M., 1966, *Studies in Cognitive Growth*, Wiley, New York.
- Cammock, R., 1975, *Confidentiality in health centres and group practices: the implications for design*, Journal of Architectural Research, 4 / 1, pp 5-17.
- Crinson, M and Lubbock, J., 1994, *Architecture, art of profession? Three hundred years of architectural education in Britain*, Manchester University Press, Manchester and New York.
- De Syllas, J., 1989, *Aesthetic order and spatial disorder in a children's home*, unpublished M.Sc. Thesis of University College London.
- DoE, 1968a, *Some aspects of design for old people*, Housing Developments Directorate, HMSO, London.
- DoE, 1968b, *Grouped flatlets for old people*, Housing Developments Directorate, HMSO, London.
- Elgohary and Hanson, 1997, *In search of a spatial culture*, Chapter 6 of eds. Awotona and Teymur, N., *Tradition, Location and Community : place making and development*, Avebury, Aldershot, 1997, pp. 81-120.
- Fisk, Malcolm, *Our Future Home; housing and the inclusion of older people in 2025*, Help the Aged, London, 1999.
- Hamdi, N. and Goethert, R., 1997, *Action planning for cities: a guide to community practice*, John Wiley and Sons, Chichester.
- Hanson, J. and Zy, J., 1992, *A High Quality and Secure Environment?*, Building Design Services, London Borough of Camden and the Tenants' Management Co-operative of the Ainsworth and Alexandra Estates, Camden, 82 pages.
- Hanson, J., 2000, *Urban Transformations: a history of design ideas*, Urban Design International, 5, pp.97-122.
- Hanson, J., 2001, *Profiling the Housing Stock for Older People: the transition from domesticity to caring*, Final Report of EPSRC EQUAL Research Project MO4884, UCL London.
- Hillier, B., 1972, *Architectural and engineering in environmental education*, Journal of Architectural Research, 2 / 2, November, pp. 111-118.
- Hillier, B., Leaman, A., Stansall, P. and Bedford, N., 1978, *Space Syntax*, in Green, D., Haselgrove, C. and Spriggs, M. (eds.) *Social Organisation and Settlement: Contributions from Anthropology*, Archaeology and Geography, British Archaeological Reports International series (Supplementary) 47, Part ii, Oxford, pp. 343-384
- Hillier, B. and Hanson, J., 1984, *The Social Logic of Space*, Cambridge University Press, Cambridge.
- Hillier, B., Burdett, R., Peponis, J. and Penn, A., 1987, *Creating Life: or, does architecture determine anything?*, Architecture and Behaviour, Vol. 3, No. 3, pp. 233-250.
- Hillier, B., 1988, *Against Enclosure*, in eds. Teymur, N., Markus, T. and Wooley, T., *Rehumanising Housing*, Butterworth Press, Sevenoaks, Kent, pp 63-85.
- Hillier B and Penn A., 1991, *Visible Colleges: structure and randomness in the place of discovery*, Science in Context, Vol. 4 No 1., pp 23-49.
- Hillier, B., 1993, *Specifically architectural theory: a partial account of the ascent from building as cultural transmission to building as theoretical concretion*, The Harvard Architectural Review, Vol. 9, pp. 8-27.
- Hillier, B., Penn, A., Grajewski, T. and Xu, J., 1993, *Natural movement: or configuration and attraction in urban pedestrian movement*, Environment and Planning B, Vol. 20, pp. 29-66.

- Hillier, B. and Penn, A., 1994, *Virtuous circles, building sciences and the science of buildings: using computers to integrate product and process in the built environment*, Design Studies, Vol. 15, No 3, July, pp. 332-365.
- Hillier, B., 1996, *Space is the Machine*, Cambridge University Press.
- Hillier, B., 1996, *Cities as movement economies*, Urban Design International, Vol. 1, No. 1, pp 41-60.
- Hillier, B. and Hanson J., 1997, *The Reasoning Art: or, the Need for an Analytical Theory of Architecture*, Space Syntax First International Symposium, London, pp.01.0 to 01.5.
- Hillier, B., 1999, *Centrality as a process: accounting for attraction inequalities in deformed grids*, Urban Design International, Vol. 4, Nos. 3 and 4, pp. 107-127.
- Hills, Sir Graham, 1994, *A renaissance in design education*, in Myreson J. (ed.) *Design Renaissance: selected papers from the International Design Congress, Glasgow, Scotland 1993*, Open Eye Publishing, Horsham pp. 87-93.
- Kolb, D.A., 1981, *Learning styles and disciplinary differences*, in Chickering, A. (ed.), *The Modern American College*, Jossey-Bass, San Francisco.
- Kolb, D.A., 1983, *Experiential Learning: experience as the source of learning and development*, Prentice Hall, New York
- Konceilik, J.A., 1998, *Design, ageing, ethics and the law*, in Roth S.K. and Roth. R. eds., *Beauty is Nowhere: ethical issues in art and design*, G+B Arts International, pp. X to X.
- Major, M.D., Stonor, T and Penn A., 1998, *Passengers, Pedestrians and Shoppers: space syntax in design*, unpublished paper from the Space Syntax Laboratory, London, 6 pages.
- Marcus, T.A., 1993, *Buildings and Power; freedom and control in the origin of modern building types*, Routledge, London and New York.
- Massey, D., Allen, J and Pile, S., 1999, *City Worlds*, Routledge in association with the Open University, London and New York.
- Monteiro, C., *Activity analysis in houses of Recife*, Brazil, Proceedings of the First International Space Syntax Symposium, London, pp. 20.1-20.13.
- Morrison, Kathryn, 1999, *The Workhouse: a study of poor-law buildings in England*, English Heritage, Royal Commission on Historic Monuments in England, London.
- Nuttgens, P., 1988, *What should we teach and how should we teach it? Aims and purpose of Higher Education*, Wildwood House, Aldershot.
- Orhun D., Hillier B and Hanson, J., 1996, *Socialising spatial types in traditional Turkish houses*, Environment and Planning B, Planning and Design, Volume 23, pp 329-351.
- Owaki, M., 2000, *A more humane life: a study of residential care units for the elderly with dementia*, unpublished M.Sc. Thesis of University College London.
- Peace, S., Kellaher, L. and Willcocks, D., 1982, *A Balanced Life: a consumer study of residential life in one hundred local authority old people's homes*, Report No.14, Survey Research Unit, The Polytechnic of North London.
- Pearce M and Toy M, 1995, *Introduction to Educating Architects*, Academy Editions, London, pp. 6-9.
- Penn, A., 1993a, *Pinterfields Hospital Development*, Nucleus Study Pack, Vol 1, Department of Health, R&D 220/00/97B1
- Penn, A., 1993b, *Day surgery units, an evaluation of spatial planning*, NHS Estates.
- Pevsner, N., 1976, *A History of Building Types*, Thames and Hudson, London.
- Robson, D., 1997, *Homes for the Third Age*, SPON, London.
- Schon, D.A., 1989, *Educating the Reflective Practitioner*, Jossey-Bass, San Francisco.
- Sir Banisetr Fletcher, 1961, *A History of Architecture on the Comparative Method*, 17th edn., Cordingley, ed., Athlone Press, London.
- Smithson A and Smithson P., 1970, *Ordinariness and Light: urban theories 1952-60 and their application in a building project 1963-70*, Faber and Faber, London.
- Teymur, N., 1992, *Architectural Education: issues in practice and policy*, Question Press, London.