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**CLOSING ADDRESS**


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**Professor Philip Steadman**

Open University, England

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The very statistics of this conference are impressive. Here are speakers from eight countries and four continents, by my count, who have given nearly forty papers picked from a much larger number submitted. The scope of what has been covered is enormous: from the house to the city, from the aesthetics of Le Corbusier to the causes of crime, from the archaeology of the first and second millennia to the design of a building to celebrate the start of the third millennium. All this is surely striking evidence of the fertility, the theoretical power and the practical usefulness of the ideas which have come out of UCL and the wider space syntax community, under the leadership of Bill, Julienne and all their many colleagues, during the last twenty years.

*Professor Philip Steadman  
The Open University  
Department of Design and Innovation  
Walton Hall  
Milton Keynes MK7 6AA  
England  
tel: (44) (0) 1908 652 944  
fax: (44) (0) 1908 654 052*

I think you have asked me to say something briefly in conclusion as an 'outsider'. I had hoped I might be accepted as an associate, a kind of honorary space syntaxian. (There is such a word as 'syntaxian' I discover. Did you know this? It means a student in a Roman Catholic college, in the class called 'Syntax', which is immediately below the class called 'Poetry'. I think this is rather nice: that there is a level on which one experiences poetry, and at the level below that, one finds syntax.) But as someone who certainly stands part way outside the world of space syntax, as defined by this meeting, perhaps I could offer a few perceptions.

A couple of years ago there was a conference in Cambridge to celebrate twenty-five years of architectural research at the Martin Centre, at which Bill was present, although he was never formally a member of that group. Someone asked Bill what was his relationship with the Martin Centre, to which - with some relish I think - he replied "Irritant". I certainly don't want to be an irritant today. That would be very ungracious on such an occasion, churlish indeed. (Perhaps I could hope instead to be a stimulant.) I certainly share the belief, as I think everyone here does, in the importance, rather I should say the *necessity*, of working towards an analytic theory of architecture. We share the conviction that such a theory must seek to find regularities in the built environment, of a broadly configurational nature. We share the view that these regularities are not readily describable in ordinary language, and are not always consciously known, either to those who inhabit buildings or even - paradoxically - to those who design them.

But it is clearly the case that the apparatus of space syntax as it now exists - of axial maps, of justified access graphs, of measures of integration and other graph-theoretic properties - all these do not exhaust the potential for a wider science of architecture and urban studies, which would still share all the same philosophical and theoretical

ambitions of the current space syntax programme. Space syntax, at its expanding boundaries, touches other traditions of research in urbanism and architecture. I think these traditions should be confronted head on, and their relationships to space syntax clarified. Certainly this is what I would like to see, as someone who looks in, so to speak, from the outside. Let me give two examples.

Axial maps provide a technique for describing the configuration of streets and open spaces in cities, and for relating these to patterns of movement by means of measures of integration. In conventional traffic simulation models, and in integrated land use and transport models, networks of streets are also represented configurationally, by means of graphs - although the formal definitions are different from axial maps. (Also the level of detail in the representation is rarely so fine.) Algorithms in these models calculate shortest paths through the networks, and derive measures of accessibility, which are closely analogous to, although again not identical with, measures of integration. On this basis the models predict movement.

What *exactly* are the comparative merits and performances of these contrasting representations and measures? Perhaps I haven't been keeping close enough track of the literature; but I don't believe I have seen tests of one kind of model against the other, on a standardised basis, against real empirical data. In Britain in the 19th century, there were different gauges of railway in use by different railway companies, and there was much debate about their comparative merits. The matter was decided by a 'battle of the gauges' - by running railway engines along the lines and seeing which could go faster. I think there should be an equivalent 'battle of the models'.

Does a representation in terms of axial lines in fact act as a better predictor of movement at the urban scale than these competing models? If so, what precisely is the explanatory role which the *straightness* of the axial lines play? I understand of course that an architectural scale, it has to do with visibility. But is this still plausible at an urban level? These certainly are questions which for me, as a semi-outsider, remain open ones.

My second challenge has to do with the interrelationship of geometry, of metric dimensions and angles, with topology or configuration. Before the conference began, I had planned to say something about how space syntax had turned away from geometrical properties, to focus almost exclusively on topological structure: on relationships of adjacency, propinquity, and connectivity between spaces. Even the metric dimensions of edges in networks were ignored, in favour of purely graph-theoretic measures of distance. Bill has argued more recently for a reassessment of this 'wasting of geometry'. I had planned to urge the same.

The papers in this afternoon's session have cut some of the ground from under my feet. We have had speakers talking about bringing space syntax techniques together with geometrical representations, and extending these into the third dimension. Alan Penn and colleagues have shown us ways of incorporating syntactical tools into 3D computer modelling. John Peponis has explained his very fascinating ideas about representing the moving observer's perception of a building's geometry. Bill has been talking about grids and their geometric properties.

My points about geometry and space syntax are however slightly different ones. First is the observation that shapes and dimensions of spaces *constrain* topology, sometimes in quite restrictive ways. Bill has shown us, quite correctly, how a plan with a given pattern of adjacencies between rooms may have very many patterns of access, dependent on the placing of doors. An adjacency graph, that is, can have many access subgraphs. But this does not mean of course that the geometry of a plan places *no* constraints on the topological relations between the rooms which it comprises. A row of rooms in a single line can only have one access pattern, a simple linear one. The relative sizes and shapes of rooms determine how many can fit around a central lobby, and hence what the maximum number of edges connected to the corresponding node can be. If rooms are arranged around a lightwell, there must be a strong likelihood, if not an absolute necessity, that a ring will be created in the access graph. Intuitively it seems more than plausible that typical shapes and sizes of blocks at the city scale have an equivalent constraining effect on the topology of the resulting axial maps. These kinds of effects, of the constraints which adjacency places on permeability, need I suggest to be examined in a systematic way. In turn the dimensions and shapes of rooms, and wings and courtyards, and city blocks, are constrained themselves by factors which are largely beyond the present scope of space syntax research.

In terms of the functions of architecture, the emphasis in space syntax has been on how people move in the built environment, and on what they see. I think the time is coming when these concerns with movement and vision might be brought into confrontation with a configurational treatment of certain other generic functions of building, as for example those of enclosure and climate control. In *Space is the Machine* Bill very kindly quoted, as a motto for one of his chapters, a couple of paragraphs from my own book *Architectural Morphology*, in which I looked forward to a treatment of the morphological constraints imposed by the needs for lighting and ventilation in buildings. Here too, as with circulation networks and movement, there are strong empirical regularities to be found in the built environment.

Just as an indication: here is a graph showing the results of measurements made on some 3500 buildings of all functional types other than houses in four British towns (Figure 1). The axes plot external wall area against floor area. Each data point relates to all buildings in the sample with a common function - shops, offices, factories. I don't know how you react, but to me these are rather striking results - the clustering of these points so closely along the regression line. At any rate I was surprised, and I was looking for just such a relationship. I suggest this phenomenon would be quite unsuspected by designers. It has to do with properties of buildings in the mass; with the constraints on plan depth created by requirements for sidelighting, combined with the average sizes of rooms. What is more, it carries very strong implications for the gross morphology of the geometrical envelopes of buildings. To use a rather loose biological metaphor (and I carry a special licence to use them), if space syntax at present deals with the bones, then there is scope for a parallel enterprise which deals with the flesh and skin of buildings.

I offer these suggestions with the idea that by confronting still wider issues in a

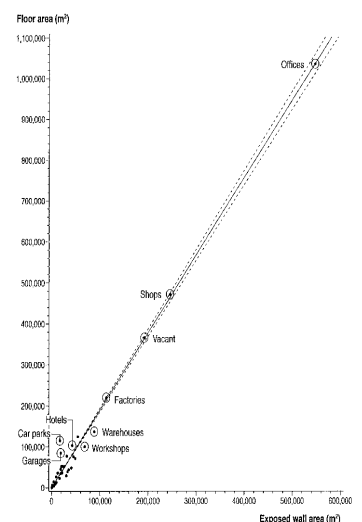


Figure 1.

similar philosophical spirit, and taking a broadly configurational approach - using that term in its widest sense - then space syntax can go on to even greater things than this meeting has demonstrated.

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I am sure you will want to join me in thanking all those who have worked to make this meeting such a model of organisation. These include the principal organiser Mark David Major and his lieutenants Georgia Spiliopoulou and Reem Zako. Luiz Amorim, Francois Dufaux and Èva Culleton-Oltay have been responsible for the production and editing of the very impressive conference publications. Then we should thank all the other helpers, all those who have provided sponsorship, and not least all the speakers and delegates, whose research and ideas have made the meeting possible. If a First International Symposium on Space Syntax can be so vigorous and exciting, then clearly this is only the first of many. Congratulations to those of you have organised this occasion, and congratulations to those whose work has inspired it.