

what seems at first to be the simplest thing about the city: the fact that it is a large, apparently complex physical and spatial object, one which is at once a record of the functional processes which historically created it, and at the same time the strongest constraint on future development. Most attempts to use computers to model the ways in which cities work, for example, have dealt with the physical aspects of the city only at the grossest level, far above the level at which most interventions are made. Since the aim of an urban model is to try to bring the structural and dynamic complexities of cities as means–ends systems within the scope of reasoned decision-making about physical and spatial interventions, this has been a critical weakness.²

The fact that the physical city has proved most difficult to model effectively is probably due to two things. First, the physical and spatial structure of cities appears, for the most part, to be the rather disorderly outcome of a long history of small-scale, incremental changes which accumulate over time to produce patterns with neither geometrical nor functional simplicity. Until recently, the types of pattern that result from these quasi-organic processes have not seemed tractable to any obvious method of analysis. Consequently they were neglected. Second, the incremental ways in which economic and social processes create the city's physical and spatial patterns seem in themselves to be quite complex, involving feedback and multiplier effects, and interaction between different scales. Processes of urban growth and change seem to exhibit both 'emergence', by which unforeseen macro changes result from a series of micro changes, and the contrary effect, by which macro changes produce unforeseen effects at the micro scale. Again, until recently, there have not been obvious ways of modelling such processes.

The apparent intractability of the city as a physical and spatial object afflicts the synthesists as much as the analysts. If we look to urban designers for an analysis of the object of their design attention, we find much moral earnestness about such matters as the creation of 'places' as rich and complex as those found in traditional cities, but little analytical endeavour to understand how the physical and functional cities of the past gave rise to such 'places'. The current preoccupation with 'place' seems no more than the most recent version of the urban designer's preference for the local and apparently tractable at the expense of the global and intractable in cities. However, both practical experience and research suggest that the preoccupation with local place gets priorities in the wrong order. Places are not local things. They are

moments in large-scale things, the large-scale things we call cities. Places do not make cities. It is cities that make places. The distinction is vital. We cannot make places without understanding cities. Once again we find ourselves needing, above all, an understanding of the city as a functioning physical and spatial object.

Multifunctionality and the part–whole problem

Where should we then find a starting point for an enquiry into the form and functioning of cities, in the hope of founding a theory of cities as means–ends systems? In situations where new theories are needed, there is a useful rule. At every stage in the development of our understanding of phenomena, we already have in our minds some conceptual scheme through which we interpret and interrelate the phenomena that we see.³ Usually there are irritating anomalies and problems at the edges of these conceptual schemes. The rule is that instead of keeping these problems at the edge of our field of vision, and accepting them as anomalies, we should bring them centre stage and make them our starting point. We should, in effect, start from what we cannot explain rather than what we think we can.

There are two such great anomalies in our current ways of seeing cities. The first is the problem of multifunctionality. Every aspect of the spatial and physical configuration of the city form seems to have to work in many different ways – climatically, economically, socially, aesthetically, and so on – with the additional difficulty that form changes only slowly while function changes rapidly. The second is the part–whole problem, or as some might prefer, the place–city problem, that is, the fact that in most cities made up of parts with a strong sense of local place it is almost impossible to make a clear morphological distinction between one part and another, at least not at the level at which it could inform design.

If the theory set out here is anywhere near right, then it will become clear that these two issues are rather more than closely related: they really are the same problem, because all functions relate to the form of the city through two generic functional factors – how we as individuals find the city intelligible, and how we move around in it. These generic factors are so powerful that all other aspects of function pass through them and influence the urban form through them. This is so because in cities, as in buildings, the relationship between form and function passes through space. How we organize space into