

ON THE SEMIOLOGY OF HABITABLE SPACE

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ABSTRACT

The paper discusses a number of 'four-function' design paradigms, drawing attention to their isomorphic properties and holistic qualities which suggest general validity for application to the design process.

The study proceeds with the assessment of the "environment" of an archetypal housing design and describes the subsequently developed paradigm.

No extravagant claims are made for the operational quality of the model. But the lack of any generally accepted paradigm leaves room for some optimism that such a model might ultimately be adopted.

The conclusion drawn is that further practical applications will be necessary before applicability, at the urban scale, might become the norm.

The author has previously described and depicted the design for an urban renewal substructure, composed of a set of components called functions.

The four function paradigm (Pearlman 1967) is summarized in the table below:

<u>Base</u>	function	the	contextual	delineation	(location)
<u>Space</u>	function	the	physical	disposition	(land use)
<u>Mass</u>	function	the	spatial	distribution	(density)
<u>Order</u>	function	the	temporal	demarcation	('grain')

Similarly, Hillier (1972) postulated 'the four-function model' and suggested that 'it can account for the more important type of architectural research into ends rather than means'. According to Hillier, 'any building can be thought of in terms of four general functions', as follows:

<u>climate</u>	modifier	(building envelope and built form)
<u>behaviour</u>	modifier	(containing activity)
<u>resource</u>	modifier	(over time)
<u>cultural</u>	modifier	(symbolic function)

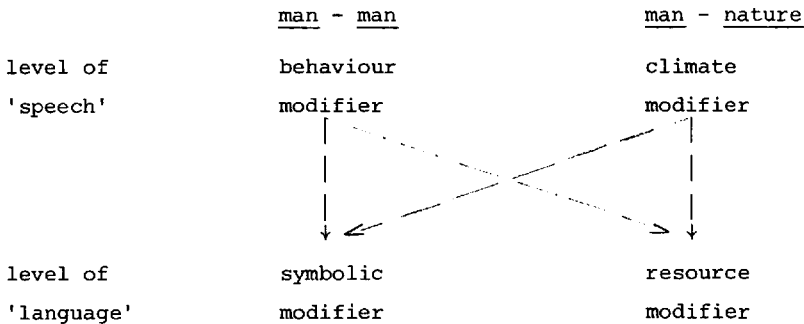
It is suggested that design or research requires the whole to be broken into parts in order to be manageable, thus each function represents one way of thinking about the whole building not simply about parts of it. Each represents an holistic approach to the building while being concerned with less than the whole. Each approaches the whole seen from a particular viewpoint. Each proposes an inter-disciplinary approach to problem solving. However, every decision the designer takes in relation to one function affects the others, hence their interdependence.

Therefore, the functional division (rather than, for example, the disciplinary or professional division) breaks down the research or design problem in terms of the basic objective to be attained by building. It offers a theoretical approach to building design, linking the artifact to social goals. Accordingly, these functions (themselves

capable of further sub-division) represent the evolving conceptual foci of architectural research.

This standpoint is supported by Markus (1976). Whilst deploring the 'lack of coherent architectural theory', he affirms the value of the four functions, citing them as 'a useful set' requiring further refinement.

Yet prior to Markus' observations, Hillier (1974) had already drawn attention to the fact that 'the four-function model turns out to be a structure in itself':



(Hillier's first version)

The focus of attention now moves to the field of architectural semi-ology and the valuable contribution of Broadbent (1977), which describes various sign concepts, drawn from linguistic circles, of which one is of particular interest, namely, Hjelmslev's postulate of the sign as a four-part structure which takes the following form:

	<u>form</u>
Plane of content	<u>substance</u>
Plane of expression	<u>substance</u>
	form

It is contended that both the four function models cited above, together with the author's recently developed four-function paradigm (Pearlman 1977), described later, are isomorphs of the semiotic tetrad established by Hjelmslev. Undoubtedly, this establishes holistic pedigree

and the primacy of the four function abstract (Pearlman 1979), a prerequisite for securing the reciprocal intentions in architecture, namely, the syntactic image and the semantic reality.

In less esoteric language, the housing crisis, for instance, remains 'architecture's and society's chief unsolved problem' (Huxtable 1976). In other words, if housing is to be home for those who live there, then the nature of our idea of housing must be altered, but at present the image of our designs and the reality of use illustrate the discrepancy between our theories and our lives; to establish the issue of use effectively means the questioning of the structure and basis of decision making (Ryder 1974).

In this part of the paper it is noted that Hillier (1974) suggests that if design method is to be improved then it is more important to study the environment than how designers design. The outcome of a case study of the housing design project (Pearlman 1974), reflecting this difference of perception in methodology, resulted in the development of a more elaborate four function paradigm, leading to the conclusion that the four paradigms displaying isomorphic properties have general validity as approaches to design in architecture.

To explain this process further, the initial step involves a repertory of existing unit types and housing clusters which have to meet the following criteria: individual propriety, collective propinquity, and propensity for combination. Accordingly, an archetypal housing environment is manifested through induction of a typology of designs and their transformation into an abstract structure, which becomes the repository, not only of any number of discrete shells but absorbs respective characteristics as well. The process anticipates 'the demand for a particular ability to plan in detail and acknowledges the fact that the making of sympathetic environment, with a variety of dwelling units is a most difficult task' (Segal 1967). Within the resulting collage, an important consideration is the fusion of differing infrastructures and the consequent evolution of 'sites' and 'parameters' for entirely new designs, not necessarily confined

to housing type. The designer's major concern is to maintain a consistent density of development within a project area, and compliance with this rule (particularly during the primary process of adaptation) will have a dynamic effect-cause; inducing a more discriminating approach to the selection of typologies.

The more familiar factors to be noted include accessibility, economy, extendibility, flexibility, occupancy, popularity, privacy, reticularity, security and urbanity. A priori, there must be utility of open space, sensibility of scale and particularity of time.

The resultant image is not simply the product of changes introduced by the disposition of the typologies of yesterday or yesteryear, but is part of a composite whole possessing its own history in transition (Smuts 1926 talked of an holistic organism which carries all its time with it).

Take two cities: Amsterdam and Milton Keynes. The one historic, the product of organic change, the other new, the product of a plan. In the former change and growth in the function and structure of the city is characterized by the expression of facades, which are important, and where discontinuous incremental change takes place within a continuous pattern of urban fabric. In the latter, change takes place not within a continuous pattern of solid urban forms. On the contrary, change as development takes place, initially, within a geometric void, i.e., the rectilinear framework of highways which make up the sides of the kilometre grid squares. The problem the designer faces here is the relative absence of any historical or temporal dimension and therefore he substitutes an abstract order for the rich complexities of the real world which impose their own constraints and disciplines.

The conclusion that may be drawn is that designers have not yet a generally accepted paradigm (i.e., abstract) which allows replication of the dimensions of time and change (i.e., process) at the scale of the city, precisely because the city is not only not a tree;

it is not simply a summation of physical artifacts. As Louis Wirth remarked 40 years ago, urbanism is a way of life and we have not yet succeeded in modelling that life in a way which allows us to act (i.e., design) in accordance with such a hypothetical model. A similar point is made by Lee (1975), from the disciplinary standpoint of psychology, who has introduced the concept of 'neighbourhood schema', to give meaning to the fact that 'people organize neural representations of the external environment by a process of successive modifications, whereby each fresh perception makes its mark on the growing schema' (not unlike what Hayek 1968 calls 'a superimposition of abstractions'). Accordingly, Lee suggests that designers 'should start instead with an environment which is not intrinsically orderly...'

In the last section it was suggested that existing paradigms generally fail to correspond to the complexities and ambiguities of the real world. In this concluding section the author would like to discuss, briefly, the development of more recent ideas concerning the four function paradigm and its application in the design process (Pearlman 1977). The following elaboration of the paradigm was directly induced from the assessment of the above cited housing design project (Pearlman 1974):

<u>Density</u>	Equipotentiality of	Intent Geometry &	Space
<u>Typology</u>	Diversity of	Archetype Scale &	Time
<u>Activity</u>	Plurality of	People Movement &	Content
<u>Territory</u>	Conspicuity of	Individual Group &	Boundary

Considering each of the functions in turn it will be argued that, in principle, it is possible to apply the tetrad in the context of real environmental design problems.

The density function asserts space as symbol of design concepts intended for the age of uncertainty. Philosophically speaking, space is nothing without matter to render it perceptible. Thus the intention to populate the limitless void with an imaginary matter. The approach which considers space as the material reality will enable design to deal with concrete environment, to create shapes which are material-

isation of forms as perceived by the senses. In other words, the notion of architectural space^{is} identified with the notion of hollowed out interior space (Giedion 1964). Technically speaking, density is a quantity of some kind divided by the area which envelops it. It is the measure of average intensity of that quantity within the envelope (James 1968). James maintains that the measure a planner should invoke, in planning over wide areas, is the intermediate one, namely, gross density. Hence if gross density is constituted as 'the measure of average intensity of that quantity' within an area, then the way is clear for correlating this intensity with the factors of geometry and space and thereby instituting its visualisation as tangible material. The design project under consideration illustrates the initial disposition of this 'material', just one of many such qualitative dispositions, of shape intensity and occupancy, available on the basis of an invariant quantitative structure.

The typology function, as conceptualised by the author, draws inspiration from the well argued case of Pressman (1974) in favour of the need to resort to the use of 'a typology of forms'. Apparently, the application of general laws concerning urban function and structure, whilst a necessary ingredient of the city's form, is not sufficient for determining the actual configuration. Hence it is suggested, that the art of city design may be a process of adapting forms derived either from past needs or from past aesthetic ideologies to the needs of the present. Pressman concludes that recourse to some kind of typological model is unavoidable. As already noted, the archetypal design, under consideration, is precisely such a manifestation of a typology of designs (albeit in this instance personal and atypical).

Further progress in generating an archetypal environment is dependent on the principle of figure-ground reversal; effectively, meaning the transmutation of the prior elements of 'density' and 'typology' into continuous background stuff - the space - time medium - 'that field of matter which appears to become plastic to the moulding power of mind' (Smuts 1926).

The integration of the two functions of density and typology leads, quite naturally, to the concept of generic form of 'continuous background stuff; from which form, in its specific sense, is seen as being derived; because whatever is salient is at the same time embedded in the whole, despite its isolation, and receives from this relationship its sense and order. Hence the contention (Stern 1930) that salience and embedding are a more comprehensive and useful pair of categories than figure and ground of gestalt psychology.

Only belated recognition of this prerequisite principle can lead to action which may arrest the continuing decline of 'the city as a continuous form as it were ground of its own configurations' (Brown 1967). The generic form, referred to above, conforms to the 'Parsonian' definition of a structure as 'a stable disposition of the elements of a system impervious to externally imposed disturbances' (Parsons 1960). But in the successive phases of evolution, of an archetypal housing environment, function becomes the dominant feature of the whole, which implies movement towards the hierarchical ordering of the elements for the realisation of specific form. (Parsons talks of functions entering whenever structures, in the sense defined above, become adapted to new situations).

So far, in the total system of structure and function (the Smuts and Parsonian models), attention has been concentrated on the prior elements of density and typology. It is now pertinent to discuss briefly the correlates of specific form: to attempt to distinguish the remaining two functions of the four-function paradigm.

As stated at the beginning, it is important to note that each of the four functions combines human and physical aspects of buildings (Hillier 1972). For instance, the activity function is concerned with the relation between human activity and its spatial containment; whilst the territory function is concerned with the psychological and physiological nature of people as influenced by built form.

The activity function links factors such as choice, communication, opportunity and security, with technique, space, function and access. In turn, these factors will inevitably become juxtaposed with the associated factors of typology, during the process of induction and combination. The effect of such action will be a series of integrations and differentiations resulting in a 'natural' variety of 'neighbourhood schemas'. In this connection, Lee (1975) has already classified the existing 'types' as follows:

physically small to physically large
physically and socially homogeneous to physically
and socially heterogeneous
socially detached to socially involved.

In summary, the activity function and its Correllate, the function of territory, as noted below, constitute a methodology through which actual configurations of the space - time continuum may be more systematically derived.

The territory function likewise distinguishes between the physical and human aspects. The former will refer to such features as climate, geography and topography; the latter will relate to factors such as 'the psychology of place' (Canter 1977) and 'the hidden dimension of culture' (Hall 1966). One of the major concerns of the function of 'territory' being to express 'human rights in architecture' (Smith 1974). In this connection the latent characteristics of the generic form should be helpful to the evolution of desirable environmental complexity. The differentiation of the disposed activities in space and the articulation of the dispersed material in time, should guarantee sufficient initial variety to be subsequently complemented by the variegated contribution which is to be expected from the inhabitants themselves.

Therefore the buildings of the new environment need not all look alike, as modern structures tend to do, when there are such distinct and important structural and functional characteristics to account for. Indeed buildings cannot optimise their energy requirements unless they

are designed to take advantage of natural elements, to respond to their different environments, which may mean different forms for each face of a structure.

The four function paradigm anticipates the rise of diverse architecture. An alternative to the hitherto reductive aesthetics will mean a more copious aesthetic which sets itself against the preponderant Greco-Roman ideal of beauty. Suddenly, architecture finds itself confronted by art, such as, for instance, proposed by Jean Dubuffet, whose sensibilities see in the pre-historic expression, a more relevant precursor for the art of our time, an alternative to the hygienic concept of objects. Before concluding, it would be as well to underline the very considerable problems which face designers working within the paradigm. It is easier to manage without it. To quote just a few problems, which incidentally are problems not unknown to other 'designers' in the field of social policy, namely, lack of knowledge and skills, lack of data and information, lack of institutional frameworks and resources. Therefore at this stage of paradigm development it would be unwise to make any extravagant claims. Nevertheless there is room for some optimism, concerning the application of a normative theory of design, because of the fact that the recent model was induced through a practical design problem. Thus the major conclusion that further work in applying and developing the paradigm to real world problems is a necessary condition for improving our operational ability and theoretical understanding.

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References

- Broadbent, G. Semiotic, Architectural Design 7-8, 1977, pp. 474-482.
- Brown, N. The Form of Housing, Architectural Design, London: September 1967, pp. 432-433.
- Canter, D. The Psychology of Place, London: Architectural Press, 1977.
- Giedion, S. The Eternal Present, The Beginnings of Architecture: Oxford University Press, 1964, p. 521.
- Hall, E.T. The Hidden Dimension, New York: Doubleday, 1966.
- Hayek, F.A. The Primacy of the Abstract, cited in Beyond Reductionism, The Alpach Symposium 1968, A. Koestler & J. R. Smithies (eds.), London: Hutchinson, 1969, p. 330.
- Hillier, W. A New Approach to Architectural Design, Leaman, A. Royal Institute of British Architects Journal, London: December 1972, p. 519.
- Hillier, W. How is design possible?, Journal of Architectural Research, London: R.I.B.A. & A.I.A. Vol. 3, No. 1, Leaman, A. January 1974, pp. 4-11.
- Huxtable, A.L. Kicked a Building Lately?, New York: Quadrangle Press, 1976.
- James, J.R. Residential Densities, Architectural Design: January 1968, p. 30.
- Lee, T. Housing as a Problem in Psychology, Northern Architect, Journal of the Northern Region, Royal Institute of British Architects, January 1975, pp. 35-39.
- Markus, T. In Pursuit of Excellence, Building Design: London, July 30, 1976, p. 11.

- Parsons, T. Structure and Process in Modern Societies, Glencoe Illinois, The Free Press, 1960.
- Pearlman, W.W. Urban Renewal Manchester, Housing Development Group, Corporation of Manchester, England, 1967.
(ed.) (See Renewal Components - Four Functions, pp. 10-11).
- Pearlman, W.W. A Housing Project, Design Competition held in connection with 'The International Conference on Housing for Emerging Nations', promoted by the International Technical Cooperation Centre (ITCC) Tel Aviv, Israel, 1974. The competition sought ideas for a 'neighbourhood' of 5000 dwellings, 'clusters' of at least 100 units and details of at least 1 basic house.
The density structure of the project compares favourably with the economic findings of an I.L.O. Report by W.P. Strassman (U.S.A.) entitled, Industrialised Building Systems for Developing Countries: A Discouraging Prognosis. See Proceedings: International Conference on Housing for Emerging Nations, ITCC, Tel Aviv, 1974.
- Pearlman, W.W. From Structure to Function: Towards a Theory of Generating Habitable Space and Urban Place, Contact, Journal of Urban and Environmental Affairs, University of Waterloo, Canada, Vol. 9, No. 2, Summer 1977, pp. 1-23.
- Pearlman, W.W. Theoretical Aspects of Environmental Psychology, International Conference on Environmental Psychology, University of Surrey, England, 1979.
- Pressman, N.E.P. The Built Environment: A Planning Approach to the Study of Urban Settlements, Contact, University of Waterloo, Vol. 6, No. 3, June 1974, p. 6.

- Ryder, S. The Image and the Reality, Progressive Architecture, November 1974, p. 62.
- Segal, W. Changing Trends in Site Layout, Architectural Design, September 1967, pp. 430-431.
- Smith, P.F. Human Rights in Architecture, The Planner, Journal of the Royal Town Planning Institute, Vol. 60, No. 12, December 1974, pp. 953-955.
- Smuts, J.C. Holism and Evolution, London: Macmillan 1926, Concepts of Space and Time, pp. 22-34 and General Concept of Holism and Concept of Fields, pp. 84-117.
- Stern, W. Cited in Contemporary Schools of Psychology, (eds.) R.S. Woodworth & R.M. Sheehan, London: Methuen, 1965, pp. 360-361.

