

THE OPEN FORM

Robert Oxman and Naomi Carmon

OPEN HOUSE INTERNATIONAL

VOL. 14, 1989, No. 1

pp. 15-20.

The concept of the open form is one of great paradigms of Modern Architecture. In its application it represented the antithesis to formal languages and architectural processes which were considered finite, static, closed and absolute. Thus openness, open-ended and open form became terms of approbation representing values applicable across the spectrum of design and design theory. In the most general sense, this body of ideas revolved about the notion of "responsiveness to process". In realisation these concepts found several distinct forms of expression. On the one hand, physical form was treated as a metaphor for process and dynamism. The exterior form and treatment of materials in Lucien Kroll's Medical Faculty Building at Louvain-la-Neuve is an example of irregularity of form, asymmetry, absence of other symbols of imposed order, and ad-hoc combinations of materials as architectural means serving as metaphors for process and openness.

Perhaps a more orthodox interpretation of architecture as a process was represented by that body of work which treats the built environment as an unfinished product, a framework within which physical form is a stimulant to, and permissive of, the processes contained within. It is in housing that the social meaning of architecture as a non-regulatory mechanism, with its concomitant implications for the role of the architect, has been most deeply explored. Several generations of architects, among them Habraken and Turner, have attempted to postulate a comprehensive philosophical approach, characterised by the non-determinism of the architectural act as a component integrated within the complex weave of specific cultural contexts and conditions. In one sense, this attitude has an affinity with the Modernist axiom of the derivation of knowledge through the analysis of particular problems and the eschewing of prototypes and typologies as antagonistic design methodology.

We might state this thesis as follows. If architecture was to fulfil its role of the provision of a framework for enhancing social and cultural processes, both the means and the ends of the design process must be relativistic rather than absolute, contextual rather than ideal, dynamic rather than static, complex and holistic rather than simplistic and reductive.

It is this thesis which constitutes one of the poles of the form-purpose controversy in architecture today. Both points of view, the formal and the anti-formal, are often polarised and treated as being mutually exclusive. In Bofill's recent Marne-la-Valle project near Paris, urban form and architectural metaphor appear to dominate con-

siderations of the residential function and human scale. The other side has often been equally deductive. Those who have sort generalised knowledge on the basis of empirical studies of indigenous housing have frequently over-emphasised the importance of the process without drawing appropriate conclusions with respect to the implications of physical form upon process, and of the mutual interrelationship between form, order, process and meaning. Particularly in the urban environment, the imperatives of form and process are equally significant.

This article addresses one aspect of that problem: the relationship between building form and the influence of form on the ability of the dweller in the housing to interact with his environment and transform it; and conversely the relationship between individual initiative and collective values such as urban form. The case study deals with the adaptive regeneration of a neighbourhood. In summarising, we shall return to the open form and to the general relevance of this case in exemplifying the necessary interaction of these apparently antagonistic syndromes of values - the open and the formal - in the generation of a multivalent architecture.

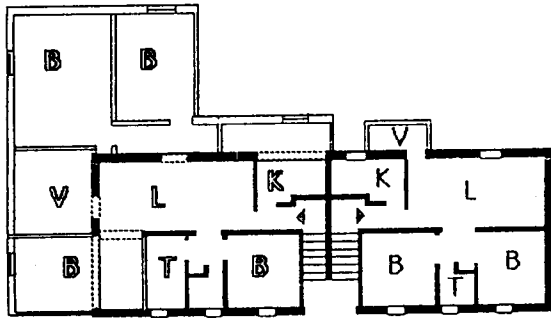
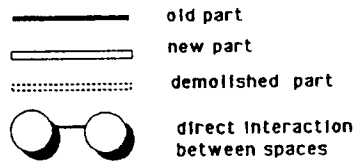
AN ISRAELI EXPERIENCE IN SELF-INITIATED RENEWAL

The neighbourhood which we are going to discuss is located in a town named Givat Olga. It has been designated as one of approximately 160 "neighbours in need" in the recent Israeli national programme of neighbourhood rehabilitation. In contrast to common stereotypes of slum dwellers as fatalistic, passive, and awaiting aid from a paternalistic authority, substantial pockets of user-initiated improvements and enlargements of the dwelling exist on a continuous basis in many of these communities. Despite the relatively low income of families in the area and certain social indicators of need, a coincidence of physical form and socio-economic factors has occurred which has stimulated a healthy process of evolution.

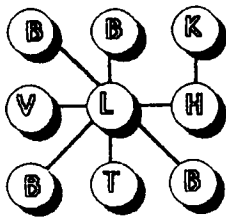
During the period of the 50's, and as a result of the mass migration of refugees from Europe and Middle Eastern countries to the new State of Israel, a large number of small apartments (25-45 square metres) were built in one and two-storey building form throughout the country. There is no evidence that these small dwellings were conceived as "core houses", or that consideration was given in any form to their potential expansion.

The housing was constructed in maximum two-storey

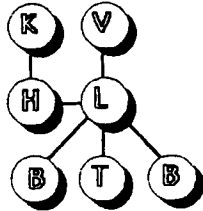
- L- Living Room
- B- Bedroom
- K- Kitchen
- T- Toilet
- H- Hall
- V- Balcony



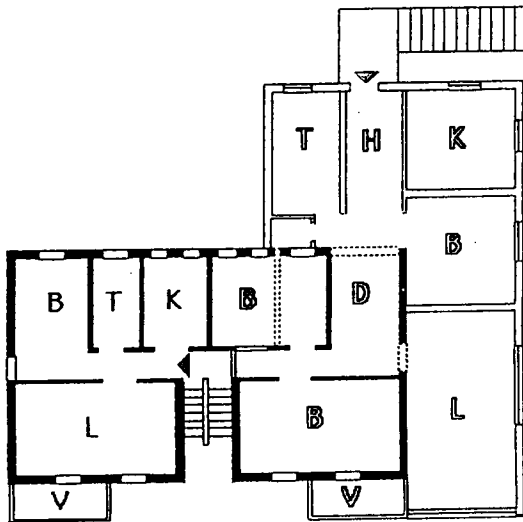
The Expanded Unit
81m²



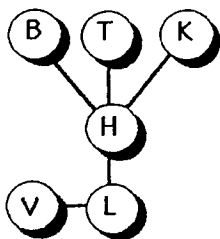
The original Unit
48m²



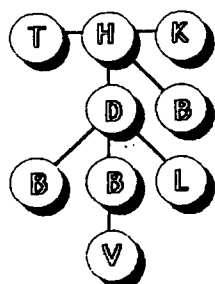
Housing enlargements in Givat-Olga



The Original Unit
43 m



The expanded Unit
114 m²



Housing enlargements in Givat-Olga

form with both the first and the second floors containing flats. The buildings were of simple linear and rectangular geometry and were of three principle types: one storey with two apartments, or the two family house: two storeys with four apartments and central access hall and stair: two storeys with eight apartments, or two four-unit buildings joined.

Considering current Israeli standards, the original dwellings were small, at an average of 40 square metres, but they provided interior plumbing, bathroom, kitchens and two or three additional spaces. The plans were geometrically compact in form and organisation, and this proved to create difficulties with respect to the large scale of the eventual additions made to the small core dwelling. The building structure was concrete frame with a concrete block infill. Interior partitions were also of concrete block. Flooring was terrazzo tiles over sand fill, with partitions built down to the structural floor rather than on the tile surface. The buildings are of sturdy masonry construction, and this heavy, durable first-build appears to encourage investment at the same time that it makes change more difficult from a technical point of view.

The average enlarged dwelling is approximately 85 sq.m., an increase of 115% in dwelling area, with some expansions of from 200-300% having taken place. The majority of additions are, therefore, relatively large considering the scale of the original plan. The additions represented a diversity of functional modifications. The most frequent change was the increase in size of the kitchen and informal dining area. This change generally took place near the initial kitchen. With respect to bathrooms and utility areas, expansion was usually an incremental addition to the existing space, branching off existing service lines. The problem of relocation of plumbing appears to act as a restraint in owner-building situations. The provision of a new, usually large, living room is also a common change, with the former living room being transformed into a bedroom. Another frequent type of functional modification is the addition of a terrace. This was often associated with the provision of a private entrance on either the first or second floor. This involves obvious difficulties such as adding an exterior stair and entering the plan from the side opposite its original entrance. But despite these difficulties, the frequent addition of the private entrance must be read as an indication of the relatively strong impetus for individualisation.

Considering that the area of the original dwelling was small and the plans were standardised, the diversity of modified plans is an impressive demonstration of the individual's ability to transcend the limitations of the institutionalised environment through autonomous change. The resultant dwellings do, however, raise certain significant questions with respect to the process. We would like to address two of these: the question of how the form and organisation of the original dwelling affect the process of designing change, and the problem of evaluating the resultant plans.

All of the plans appear to have been conceived in an additive rather than synthetic fashion, and from inside-outward, with minimum attention to the effect of the

change on the exterior massing of the building. The structure of the original plan type is the geometric basis upon which the new plan is generated. That is, there is a marked tendency to build on the lines of existing corridors and partitions. However, occasionally, one can observe the creation of a totally new plan diagram, and one which represents a unique and unexpected transformation of the original plan type.

We found several architectural factors which appear to be influential during the process of continuing design. Existing wall openings, despite the possibility of closing by new blockwork and making new window openings, are invariably left in place and tend to limit possibilities of partition relocation. Entryways and their connection to the circulation pattern of the plan appear to be equally constraining. Both from a psychological and technical point of view, plumbing - especially waste lines - tend to be conceived of as static, fixed and difficult to move.

With respect to functional evaluation, the addition of area to these small dwellings undoubtedly improved their livability: and the level of satisfaction expressed by those who had renovated and enlarged their apartments by themselves was high. Beyond any doubt, the process of autonomous growth and change improved the functional performance of the dwelling and acted as an efficient strategy for reducing the discrepancies of fit between the minimal functional accommodation of the initial dwelling and the changing needs of the inhabitants. Despite the generally positive results of the process, it may be germane to analyse some of the classes of functional problems related to the process of self-initiated change.

SOME FUNCTIONAL PROBLEMS IN SELF-INITIATED CHANGE

Handling the design of circulation in an efficient manner involves sophisticated design paradigms and circulation was found to be the greatest single source of functional problems. It constitutes one of the problem areas in the expansion of dwellings and in self-planning. It appears largely that the nature of the existing circulation diagram and its potential for change was not comprehended and realised in the plan modifications. Of course, this problem was aggravated by the large relative scale of the expansions and the compactness of the original plan. Some of the resultant problems were: extended lines of

circulation; access to one room through another, often qualifying the use or privacy of the traversed space; cancellation of small spaces due to use as a circulation way; qualification to the furnishing and functional quality of a space due to traversing paths caused by excessive or mislocated door openings; the creation of rooms requiring the use of an unrelated space such as a kitchen as a means of access.

With respect to the additional factors of functional accommodation, zoning and flexibility of use, the modified plans represent a wide range of variation from those which function well to those which function poorly. Small incremental additions, as in the expansion of separate rooms, tend to preserve the original nature of the plan and its functional integrity. The larger the addition on the same floor relative to the area of the original plan, the greater the potential for dysfunction.

The size of new spaces was often disproportionate relative to the size of original spaces. It was impossible in most cases to make a complete reallocation of interior space through relocation of interior partitioning. But many ingenious modifications achieved an appropriate reorganisation of spatial subdivision with a minimum of relocation of original partitions. Because of the relatively large size of the expansion, the original dwelling was often completely wrapped by new building volume. Sufficient quantities of light and air available to all rooms was a significant problem. However, we found no examples of windowless rooms, but some examples of rooms being changed to circulation ways, because they became completely interior spaces. Various solutions to this problem, such as the use of a terrace as a light source for several surrounding rooms, were ingenious.

Almost all of the improvements involved some degree of personalisation of the exterior of the dwelling through the use of special materials such as stone, stucco textures, paint, gardening and decorative grilles and fences. The resulting appearance suggests a strong impetus to individualisation rather than any attempt at homogeneity. This heterogeneity of form and finish typifies the visual quality which comes about as a result of spontaneous, autonomous growth. In this case there was no coordination and no regulation. The physical result raises many questions. Should regulation of autonomous processes take place, or are the two mutually exclusive? Can one, in fact, order freedom and design for spontaneity; and if so,



in what way can such soft or stimulative regulation be achieved? The problem of coordination and regulation is a question inherent in this strategy of growth. Here expansion was "outbuilding", or growing out from a core, as compared to growing downward as in the case of the Israeli version of the Arab house, or expansion in other traditional building forms such as "inbuilding" in stages within the walls of a patio house. It seems clear that strategies of growth - these formal systems - differ considerably with respect to their relationship to and implications for the urban form.

IMPLEMENTATION

How were the changes designed and built? Households were completely on their own, building, within limits of legal approval, as they wished and when they wished, without overall coordination. In the two storey building form, being on the second floor offered only moderate constraint in scale and form of expansion, and there are many cases of second storey expansions without ground floor expansion. Perhaps the reason for the first floor family agreeing to building above its potential expansion zone, is that it gets a bonus of free roof structure from its upstairs neighbour.

Virtually all of the families participated to some extent in the design process, with approximately half of the modifications designed by the family itself. The remainder of the households received some form of technical assistance in the design process on the part of contractors or technicians. With respect to functional quality or efficiency of planning, there were no appreciable differences in the aided and autonomous groups. We found many instances of intelligent, sensitive and ingenious planning in owner designers despite the inherent difficulty of providing for such a large degree of expansion. It is probably a reasonable assumption that in similar situations, most inhabitants, being strongly motivated, can learn planning paradigms rather quickly, especially when the process is taking place all around them, and full scale examples are plentiful. With a relatively small effort in the form of games, models and other simulative devices, the process of autonomous design could be easily enhanced.

Considering that the enlargements employ masonry construction, a relatively large number built by themselves or participated in the construction process. Approximately



20% undertook the process of building by themselves, while an additional 20% participated in the process with hired help. The remainder either hired a contractor, or acted as general contractor and hired and coordinated the work of sub-contractors. Almost half of the households paid for the construction from savings; others used loans, only one third of which were financed through the central government. So the phenomenon may be said to be truly autonomous, having been little influenced by government incentives.

FACTORS OF INFLUENCE IN USER-INITIATED RENEWAL

There appear to be various factors which may be considered necessary preconditions and others which enhance the process of user-initiated growth and change. Building type appears to be a dominant factor. The one and two storey buildings provided desirable conditions for autonomous, spontaneous growth. The second floor appears not to deter the process or affect the size of the enlargement. It may be that in flat topographical conditions, the two storey building is limit of scale with respect to easy possibilities of additive growth. A necessary factor is the availability of part of the site in the form of a land reserve into which the core may expand. Dwelling frontage, or the number of potential directions for expansion is the third of the design conditions which enhance dwelling expansion. The corner, three orientation buildings, offered greater possibilities for expansion than the interior, two-sided, dwellings. Among the reasons for this are the the length of building envelope available for expansion.

Among other architectural features which enhance or hinder the process are technical systems. Concrete frame and concrete block infill proved to be a good balance of durable masonry construction which did not become dilapidated, and a technology which could be relatively easily modified. Soil conditions provided no special problems with respect to building foundations for new construction beside the existing building. Interior block partitions are easily relocated, despite the problem of repair of tile floors (built to concrete sub-floor) in areas in which partitions have been demolished.

Ownership is a significant ingredient in the willingness to continue investing resources in the dwelling. The home is a common focus for investment in modern Israeli society.



Furthermore, the process makes possible the gaining of potential financial profit through the exercise of individual initiative.

Such processes are dependent on more than physical conditions. A supportive system of laws and regulations, a degree of sympathy on the part of the authorities who apply these regulations, a complementary programme of financial incentives and suitable concomitant development of the public realm in a physical sense, all of these seem essential parts of a total system. Here the coincidence of physical conditions and socio-economic factors coalesced to produce a self-regenerative system. In a world in which the term mass housing is connotative of the deprivation of individual rights of freedom to build, something happened here which preserved that freedom. The housing functioned as a dynamic service over time, and proved itself responsive to the extensive cultural, social and economic changes of 30 years. This was not government sponsored renewal, but rather continuous, spontaneous self-regeneration through the process of adaptation of the physical environment to the changing needs, preferences and ability of the dwellers.

The malleable physical system functions as 'an architecture of democracy' in the sense that housing form acts as a framework for, and to some extent a stimulus to, change. It provides the possibility of staged and continuous fit to the spatial requirements of the family. The housing stock as a whole is in a process of continual adjustment. The technical aspects of building technology were not hindrances, but neither were they primary causes. The distinction between technique and design as agents in this process was not clear. It was the density, height and form of the buildings and existence of space around the buildings which made it possible. The building form not only provided a realm for individual endeavour in the form of a zone of potential expansion, but, in addition, the building form and scale tended to make this potential legible. The housing as it evolved began to suggest a form unlike the conventional image of multi-family housing. We begin to visualise a housing type which might be termed 'linked expandable houses'. What is implied is the possibility to create group housing in low rise, medium density form which preserves the potential for individual expansion, that zone of individuality which differentiates the house from the flat.

With respect to user-initiated, spontaneous and continuous growth, it is low-building which most immediately combines the components of opportunity, ability and identity as they operated here. In order to achieve densities appropriate to urban development we must explore the problem of growing dwellings in low-dense housing groups, and we must pre-plan for growth in a manner which preserves individual freedom and spontaneity as well as the positive environmental qualities we have for years hopefully associated with low-dense housing groups. These two realms of private and public come into potentially greater conflict as they overlap and lose their distinction. That is, if the private realm grows outward, it continually changes the character of the public realm, all the more so as housing becomes low and dense.

PROPOSED DESIGN GUIDELINES

We may sketch tentative guidelines for an adaptive housing form:

Building Type as Self-Stimulating Mechanism

The dwellings differed from conventional apartments in the sense that they did not limit the ability of the dwellers to territorialise additional space. The house should be read as unfinished, and should express its potential for growth. It should be suggestive of its possibilities. Low-dense building form, preserving the legibility of connected individual units, each with a territorialisable space, offers a promising alternative to the static, completed dwelling in conventional blocks of flats.

The Design of Freedom

One of the fundamental questions is the necessity of pre-planning versus laissez-faire growth. This is undoubtedly both a theoretical and a practical question. The ability to structure freedom, or to provide the appropriate seeds for future change without canalising the freedom of the individual, is the challenge of design for change. At what point does pre-planning constitute unnecessary control and regulation? At what point does lack of pre-planning fail to stimulate responses on the part of the dweller? Our experience seems to indicate that the problems of dysfunction and inefficiency will be reduced, if some accommodation for future change is built into the original plan, even if this means bringing into pre-planned relationship the core dwelling and the strategy and scale of its change. Understanding change is fundamental to the ability to accommodate change.

Zoning Growth and Defining Boundaries

Systems of spatial zoning like the "zone and margin" in the SAR design method may provide a means to predesign potential growth without prescriptive planning. The system would designate a zone as a space preserve between initial construction and lines of possible expansion. The system of zoning may help to preserve the overall integrity of the environment while sustaining individual freedom.

The boundary of an expansion zone defines the limits of vertical or horizontal growth. It creates a predictable edge of common agreement which can be considered as a fixed component of the planning process, or as a physical element. This serves two purposes. Firstly it provides a potential means to resolve the "scale interaction problem", the discrepancies between the requirements of the individual dwelling and the imperatives of urban form. Secondly, this system of expansion zone and articulated boundary may in itself be suggestive of its potential for growth. Form, like DNA, may carry the potential for the generation of change.

Staging the Process of Growth

The growth of a dwelling may be in stages, none of which are necessarily coordinated between dwellings. In mass housing we must generally achieve a certain minimal density. To accomplish this in low-dense building groups means bringing dwellings closer, making them more three-dimensionally contiguous. As this occurs, the potential

conflict between public and private becomes exaggerated. These fundamental problems may be ameliorated within the dwelling by zoning interior circulation for ultimate growth; and between dwellings by establishing agreed upon boundaries to zoners of expansion. The public-private interface is fixed without inhibiting the freedom within the zone of growth.

The pre-planned relationship between a fixed core and a flexible field of growth and the design of special building types and forms which lend themselves to growth offer rich potential for study and development.

Supportive Technology

Though the emphasis has been placed upon appropriate design decisions as being the generative factors in the growing house, the existence of supportive technical systems may enhance the process. Foundations should be planned for vertical or horizontal additions. Interior partitions should be non-masonry, if possible, and built upon finished floors. Finishes, exterior walls and window openings must accommodate planning changes. Technical systems such as plumbing and electricity should be pre-planned for expansion.

Supportive Software

The availability of technical aid in the form of planning and construction guides, models, simulation games and other such planning and construction aids which serve to increase the user's knowledge of the planning and technical processes involved, would greatly enhance user initiated change.

This kind of building often runs counter to conventional practices of building permits and laws which recognise one-stage construction. An institutional precondition is the necessity to modify laws and legal procedures in order not to provide unnecessary obstacles in the way of an essentially positive phenomenon. In addition, creating new regulations which recognise the spontaneous building process as well as the minimisation of restrictions in "free zones" would enhance the process of user-initiated improvements.

SPONTANEOUS GROWTH AND URBAN FORM

Aesthetic questions associated with the appearance of this form of spontaneous growth appear to be trivial relative to the potential individual and social benefits. At the level of superficial responses to visual quality, the praise - "like a Greek village", or damnation - "chaotic and slum-like", are about equally divided and equally specious. Perhaps a more meaningful generalisation is that processes of spontaneous, additive growth tend to be purposeful only at their own environmental level. Additive regeneration may be incompatible with the values inherent in scales larger than the dwelling, especially when this addition is incremental, added separately to individual dwellings, rather than to buildings as a whole. In the sense of the formal qualities of the city, the imperatives of urban form do not appear to be well served by additive, incremental spontaneous growth, at least as it developed in Givat Olga.

This case of the additive regeneration of the urban fabric

operated on the basis of a fortuitous coincidence of factors. There appears both in our work and that of others such as Vernez-Moudon (1), to be a clear relationship between building type, scale, density and the spontaneous generation of this phenomenon. In the sense of structural order, it is the form of the environment which is one of the major constituents in the process. That is, a type of order or a set of ordered relationships existed which were non-deterministic with respect to this particular mechanism of growth.

The point is that open-form implies a type of order and it is the characteristic of order which we must define as principles of building forms. Communication is another aspect of the relationship between form and the behaviours associated with a particular formal order. Lyall (2), in discussing the work of Hertzberger, points out the importance of the communication of potential for personal intervention in the environment as an axiomatic condition in the architecture of democracy. This notion of the tension between differing, often conflicting, messages, communicated by architectural form and the necessity to create a situation of articulate non-equilibrium which stimulates personal intervention, is one of the challenging points raised by Hertzberger. Implied is a question of multivalence in which "personal from" acts as a stimulant to personal intervention without subverting other types of message.

This brings us to another point about the operative nature of open form. Obviously the ideal of a participatory housing form is not new and in its various forms it has been the subject of almost unqualified enthusiasm among architects during the Twentieth Century. Despite this, the idea has not taken root in the way in which we had expected. An analogous experience is that of the industrialisation of building. In both cases, the total problem context is inherently complex and the design and technological aspects represent only isolated factors of a much larger total system. In the case which we have described, the process may have been easily short-circuited by institutional or administrative impediments as well as by formal or technical factors.

With respect to open-form, it is a particular pattern of relationships which is operatively significant. Scale may be one aspect of form in such a structural pattern of factors. The order of magnitude may be such that a small change in scale may introduce insuperable impediments to the autonomous character of the process. It may be possible that a structuring order can enhance freedom while responding also to urban formal requirements. The concept of a structural model of relationships contains the germ of reconciliation between form and purpose, between personal form and urban form.

*Robert Oxman and Naomi Carmon
Technion, Israel Institute of Technology*

REFERENCES

1. Moudon, Anne Vernez (1986) *Built for Change* MIT Press, Cambridge
2. Lyall, S., (1976) 'De Drie Hoven, Old People's Centre, Amsterdam', *Architectural Review*, Feb, pp 81-82