CREATIVE LEARNING APPROACHES
FOR
AN URBAN DESIGN PROCESS

by

John Zacharias
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Department of Community and Regional Planning

The University of British Columbia
Vancouver 8, Canada

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Our age is characterized by the fundamental contradiction between the increasing functional complexity of the environment and the apparent, structural simplicity of the design process, and the designed environment. This dichotomy has made man a stranger to his own world, isolating experience from action, and restricting his behaviour in the environment. The conscious design process of today, characterized by systems, hierarchical organization, external control, and formalized rules and strategies, is no longer adequate in an era of rapid change. Self-conscious urban design as a process of giving form and meaning to the environment, has itself become meaningless.

"Creativity" is identified as the primary link between experience and meaningful behaviour in designing the environment. It is characterized by responsiveness to environment and to change, openness to experience, and the open-ended synthesis of information. While creativity has been considered as the phenomenon of individual internal synthesis, it can be externalized as an urban design process following this general pattern: First, creativity can be operationalized for design purposes in every individual. Second, the environmental conditions for creativity, called "attitudes" can be designed into the environment for increased "arousal" in individuals. These include conflict, ambiguity, complexity, novelty, and expectation. These attributes transform the environment from
an aesthetic field to an activity field, through the "kinaesthetic experience". Third, areas for individual creative action must be present in the environment, which is then characterized by functional flexibility, continuity of change, and design contingencies. The conscious design approaches, viz. Formalist, Heuristic, and Operating Unit are shown to be inadequate according to the above criteria. Ad hoc approaches are examined as the design approach alternative, and methods for obtaining feedback are listed that enable the ad hoc model to become responsive and creative, rather than merely palliative.

Finally, the distinguishing characteristics of the learning approach to urban design are listed, with some implications for its planning future. The salient features of the approach are shown to parallel identified creative processes in government, architecture, industrial management, biology, design and technological production.
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A government cannot have too much of the kind of activity which does not impede, but aids and stimulates, individual exertion and development.... The worth of a State, in the long run, is the worth of the individuals composing it; and a State which postpones the interests of their mental expansion and elevation, to a little more of administrative skill, or of that semblance of it which practice gives, in the details of business; a State which dwarfs its men, in order that they may be more docile instruments in its hands even for beneficial purposes, will find that with small men no great thing can really be accomplished; and that the perfection of machinery to which it has sacrificed everything, will in the end avail it nothing, for want of the vital power which, in order that the machine might work more smoothly, it has preferred to banish.

John Stuart Mill, *On Liberty*
INTRODUCTION

The urban environment is entirely man-made. Every element within the man-made environment is a result of some felt need, purpose, or creative process. Our ability to continue to recreate this environment in our own image is contingent upon our ability to understand the physical world, and find outlets for creativity. Urban design is the process whereby individuals interact with the environment on a meaningful level, create through the communication of ideas, and learn from the experience of the recreated environment.

A number of changes in the man-environment relationship have made a new approach to urban design crucial. Cities today are characterized by a seemingly random process of growth, and the discordant use of a plethora of materials and construction methods. An increasing rate of change coupled with a rising scale of design action have created a disparity between how the environment operates and how it is perceived - functional complexity and visual simplicity. These conditions of instability have undermined the meaningful form of the city, and the individual's experience of that form. The lack of meaning in our cities is really an alienation of experience. The individual influences an increasingly smaller area of the world
he experiences, so that his behaviour is effectively severed from his experience. Design without meaningful experience is not design.

Traditional urban design was concerned with the historical continuity of the city. It conceived of the pre-industrial city as a closed system in which individuals shared a common experience of the environment, disposed of a limited array of materials and methods of construction, and so acted in concert to produce their city. Man, experience, and environment were harmoniously linked. As technology transformed the city and the complexity of problems and solutions increased, the design function fell into the hands of specialists. It is apparent that historical continuity is no longer a salient feature of city design. The vast repertoire of buildings, spaces, and methods of design in the modern city has a short history.

The rational-scientific approach to design is in part an effort to return to a human-centred urban design. It searches for universal values and needs that can be satisfied through a systematized approach to design. It is history-less. Rational problem-solving attempts to achieve a better "fit" between need and design, by proceeding according to established rules or with some certainty of success. The specialists of the rational-scientific approach attempt to define the physical
needs of behaviour in isolation of the individual's experience. Dostoevsky in Notes from the Underground imagined a world in which the "psychologists" had catalogued all of man's responses, and were thus able to predict every conceivable action of man under given conditions. He supposed such a world in order to dismiss the effort as impossible and undesirable. Urban design of this nature is problem- and need-oriented, and its results are at worst palliation, and at best often lacking in meaning.

Both of these design approaches, though diametrically opposed philosophically, do have one thing in common: they are concerned with the hardware of city design, the physical results rather than how the results come into being. Both approaches assume a specialized design corps, and a hierarchically organized design process with formal, externalized rules. Urban design has failed to give meaning to the process of city-building, and has failed to involve individuals. The increasing complexity of problems, the emergence of the 'meta problem' (Chevalier, 1967), the confusing profusion of methods and materials available to a small group of specialist designers, have rendered our design efforts arbitrary and largely meaningless.

This thesis sees the innate human ability to act purposefully on the environment as a means of escaping our
design quandary. Creativity is the ability to adapt and to re-order. It is the interface between man and his experience of the environment. Through creativity man is able to give meaning and form to his experience and to his physical world. Meaning and form are the achievement of urban design. The urban design process must become concerned with the stimulation of individual creativity, the interaction of ideas, and the outlets for individual design action.

The creative environment is both the source of ideas and the stage for creative action. The psychological makeup of the environment can be controlled so as to induce the state of "arousal" precedent to the creative process. Our knowledge of this area is largely confined to the field of aesthetics, since it is the visual sense that dominates our perception. Other sources include the psychology of perception and the emergent field of psychobiology. The purpose of efforts to introduce aspects of complexity, novelty, ambiguity, conflict and expectation into the environment is not to refine the individual's aesthetic sense, but to initiate design interaction.

An increased rate of change in the environment is made acceptable by scaling the change to the individual. The learning approach to design assumes that plans never present a totality or final product but initiate a series of small-scale responses. The ad hoc, or improvisational approach to design
assumes a constant flux in environmental conditions - the conditions of rapid change. The existing and emergent conditions of rapid change necessitate an atomisation of design. Ad hoc action is incremental, but not piecemeal, since it is a response to ever-changing needs and purposes. The learning approach to design necessarily involves all individuals in society, since it depends on a generally accepted, constantly evolving pattern of needs, ideas, and physical forms.

Plans are necessarily open-ended since the creative process of synthesis in individuals is also open-ended. Elaboration of the environment through the design of the personal environment is an individual effort. Design as an anonymous response to simple defined needs, does not meet the individual's basic need for identification with his environment, and for a complexity of meaning. Planning for creativity incorporates flexibility of function, continuity in time, and environmental contingencies. A selective view of present planning methods attempts to define the operation of these principles.

In order to succeed, the learning approach to urban design must make information available in a meaningful form to the designers. The creative process, seen as an urban design process, must organize all information as the initial stage in creative synthesis and creation itself. This will
ensure that the overall environmental product at any stage in its recreation has the coherence familiar to evolving systems.

Other programmes will orient individuals to a participatory role in the design of their environments. This will mean experimental design, where individuals participate in impermanent environments, and alter them according to the perceived results. Educational programmes will orient the individual to a changing environment and assist in the articulation of experience, and in the process of making concepts reality.

In a symbolic sense the learning approach to design is a return to pre-industrial days when city-building was an important ritualistic experience of almost every citizen. The cathedral-building of the Mediaeval French towns demonstrated a true community and environmental awareness in a way the political system could not. A faith in the creative potential of man may yet be the key to a humanistic environment.
CHAPTER 1: CREATIVITY ROLES IN URBAN DESIGN

1.1 Creativity

The third edition of the Shorter Oxford English Dictionary does not acknowledge the existence of the word 'creativity'. Creativity has nevertheless been defined, simply and concisely, as 'the ability to bring something new into existence' (Barron, 1965). The value of the creative process is in infusing life with the new, the novel and the unexpected that enriches what might otherwise be a monotonous existence. Creativity means change. "The creative process is the process of change, of development, of evolution in the organization of subjective life" (Ghiselin, 1952). The notions of development and evolution suggest that creative action is incremental and purposeful, and is neither an accident nor a giftedness of certain individuals. A creative product is the result of human purposes, rather than either the random processes of nature or trial-and-error processes of human activity.

Studies in creativity have dealt with three major areas - the individual, his characteristics, and the processes through which he arrives at the creative product; the relationship of creativity to the transactions between the individual and his environment; and the environment, its
Most of the literature dealing with the individual and internal processes of creativity emphasizes the giftedness of certain individuals, the unusual combination of learning, personality and circumstance that inspires great works of literature, music, visual arts, film and philosophy (Thurstone, 1950; Ghiselin, 1952; Newell et al, 1958; Dewey, 1934; Galton, 1870). Heredity is a factor that has been disputed as a possible influence on the creative functioning of exceptional individuals, but heredity has never been sufficiently separated from environment. A certain type of primrose produces red flowers when grown at low temperatures, but white ones at higher temperatures. Its flower colour is certainly an hereditary trait, but what is inherited is not a particular colour but a particular norm of reactivity to temperature by the pigmentation process in its flowers. As an analogy to the human situation we might suppose that while the conditions precedent to creativity might be inherited, the presence of creativity in an individual is a result of environmental factors.

Intelligence is another factor that has been linked with the creativity of the individual. But it has been shown that intelligent people are not always creative, and more important, that creative people are not always overly intelligent (Getzels, 1962). In dealing with the concepts of intelligence and
creativity, we are not studying separate 'faculties' of the mind, nor dealing with distinct factors, but simply with modes of thinking (Wallach and Kogan, 1965, 1965a; Shonksmith, 1970; Guilford, 1950).

The second area of creativity study examines the interaction of individual and environment. The relationships between creativity and perception, thinking, and imagery are examined (Arnheim, 1954; Jung, 1928, 1964; Kreitler and Kreitler, 1972; Lowenfeld, 1939).

The third and last field is the one of chief concern in this study of the design process in the urban environment. Creativity as discussed by writers concerned with the physical and social environments, is concerned with the apperceptions and abilities inherent in every individual. This kind of creativity is called "self-actualizing creativity" by Abraham Maslow (1962), "the creative attitude" by Erich Fromm (1941), and "openness to experience" by Carl Rogers (1959). These authors argue that inspiration and idea synthesis need not necessarily culminate in a physical product, since the creative drive itself is an insufficient task master for the hard work involved in an artistic product. Inspirations and insights are a "dime a dozen", and there are many more people with good ideas than there are creators. Creativity is released from the bond to productivity that characterized
earlier analyses, and it is no longer seen as an accident of unpredictable circumstances, the past-time of an intellectually gifted elite. It belongs to people in general.

The work of these social psychologists in the field of human development has direct consequences for the formal design process in the urban environment. It is proposed that planning through its ordering effect on the environment strongly influences our creative ability and the area in which individuals can 'act out' their creativity. Creativity on both conceptual planes and practical planes, is essential if we are to achieve satisfactory living and working environments. The task of those concerned with the process of urban design is to activate the incipient creativity in individuals, and direct it toward the physical environment and toward an expressed result.

1.2 Experience

Experience is invisible to the other. But experience is not subjective rather than 'objective', not 'inner' rather than 'outer', not process rather than praxis, not input rather than output, not psychic rather than somatic, not some doubtful data dredged up from introspection rather than extrospection. Least of all is experience 'intrapsychic process'. (Laing, 1967, p. 17)

Thus some of our current notions of experience are criticized.
Perhaps we can best define experience by examining its changing role in current society.

Experience belongs to the individual. How an individual experiences his world largely determines his ability to comprehend it and act upon it. It is crucial that experience of the environment be made meaningful. This can be accomplished by integrating experience and action, actively encouraging environment-building by individuals (Sivadon, 1970; Laing, 1967).

Psychological distance to the perceivable world is diminishing (Moles, 1967). As the individual reaches further into abstraction, into depth, the implications of any action become greater. All action takes on increased meaning as the perception of the event deepens and widens. Thus the world takes on increased meaning generally, and expanded awareness demands a broader field of action.

The relationship between psychological distance, meaning and awareness is exactly analogous to the idea that the creative attitude extends the experience, and is an out-going
process, while the consumer attitude is inward-directed.

It is proposed here that society is tending away from a consuming ethic toward a producing ethic. Meaningful experience is derived from the increasing out-going activity of individuals. The result of producing, creative activity is increasing amounts of change in the physical environment initiated by individuals.

1.3 Environment - A problem of Design

Present wisdom in the field of environmental planning concerns itself with the overt quality of the human experience. In an urban context, planning and architecture are concerned with built environments that change in small and discrete jumps. We plan in stages, or we project our ideas for the future design of the environment toward a specific time and place; perhaps 1984, 1994, or 2001. We do not understand the future as a changing state but rather as conditions static.
in a given moment of time. The architect-designed environment creates conditions that are then subject to random action. The contemporary urban landscape has the appearance of a modular puzzle, where blocks are removed and eventually refilled, seemingly at random.

The scale of change increases as our technology and organization permit us greater scope for action. Conceptualize the urban environment as a block grid in which 1/4 or the potential action sites are under change at some time in the past. If the scale of change quadrupled in the present, and the rate of change remained constant, then the quality of change is remarkably different. Change is not as perceivable in the present since the discrete jumps of change occur over a longer period. In the first case, change can be perceived as such, because it inevitably occurs within a foreseeable time span, while in the second case, change appears as disruption since the end-product is outside the perceivable time span.
The first scheme is relatively more complex than the second in terms of visual and activity patterns. It has been shown that people prefer intermediate levels of complexity (Fiske and Maddi, 1961).

The environment is tending toward extreme visual simplicity and functional complexity. The office building of today contains a complex function but exhibits only gross simplicity in its exterior form. The activity within bears no relation to the design without. Appearance does not relate to function.

As the possibility of action diminishes, so does creativity itself. The scale and rate of change in design, then, vary inversely as creativity. The clues to successful design participation in the urban environment would appear to lie in the process of change itself. Reducing the scale of design and transforming the conscious designing process to a subconscious designing process, will be discussed in Chapter Three.

The major undesirable effects of change occur in the period of upheaval and change-over. Normal levels of activity can be accommodated in the environment when the change is incremental and response-induced.
Man's motivations to act were once thought to be based in reason. Attempting to understand behaviour was to probe within the rational mind, however self-seeking and indulgent it might appear. Man was the centre of the universe. Disasters on a world scale wrought by man himself, wrenched us from this ideal, and instigated numerous researches into motivation and behaviour. Both Wilhelm Wundt (1832-1920) and William James (1842-1910) noted flaws in the simple, anthropocentric view of man in the pre-industrial age. Freud's *The Interpretation of Dreams* (1900) was a crippling blow to the fond belief in the will-power and reason of man.

The new views are, among other things, a clear attempt to break down the barriers between experience and environment, between man and nature. Man had seen himself as master over animals and nature, and suddenly man was himself an animal, a part of nature. Several different approaches in psychology were launched to attempt a re-synthesis of man in environment. Owing philosophically to Newton and Darwin, Behaviourism declared man to be flexible, malleable and a passive victim of his environment which determined his behaviour. The human being was bereft of purpose; thinking and emotion became random and superfluous activities of the human animal.
Early studies of human behaviour relied heavily on first-hand documentation of experience, the product of introspection, rather than experience itself. A concomitant effort was made to explain the creative impulses of an individual in terms of the physical setting. Later the simple premise permeating most thinking on motivation might be summarized by regarding man as a solitary unit in a universal scheme of things. This placed limits both on the body, whose actions we know to be limited and on experience, the functional limits of which we do not know.

Attempting to define how experience influences behaviour has led many psychologists and designers to a functional definition of environment. This has been useful in arriving at manipulable units of the environment.

Man's senses have been viewed as a useful interface with the environment. His every effort was supposedly directed toward survival in a basically inimical universe. Clothing supplemented the first interface, releasing man from some of the discomfort and difficulty of direct contact with the elements. A shelter was the second major interface with the environment, repelling the major destructive forces in the environment, while creating an "ideal" physical and psychological climate of its own. In this way man was released from the necessity of coping with the outside world, foraging for
sustenance, competing with other animal life for food and warmth. He gained the luxury of leisure and with it introspection, as his understanding and attention could afford to be directed inward. This model of the environment satisfied man's basic needs but had no place for creativity.

The pseudo-science of planning for needs attempts to provide such an ideal environment. The artificiality of constructing a dualism of external forces and internal needs is apparent in much of the planning and architectural literature. Proshansky (1970) succumbs to this paradox in his attempt to define "the environment". He categorizes the external environment by atmosphere, light, sound and biology. Factors such as insulation, air temperature, winds, humidity, precipitation, dust, odours, gases, etc., constitute atmospheric conditions impinging on the "internal environment" of the individual. The external forces are assumed to be antagonistic to human needs and creativity, and an acceptable external environment is created by reducing their impact. But one could argue that actions to mollify the biological world dehumanize the environment and reduce the individual's variety of experience and his possibilities for action.

A too-articulated physical setting for the human being overemphasizes the security need and underemphasizes the creativity need. Planning in general has shown a partiality
for primary physical units. In examining artificial entities such as the family, the home, and the neighbourhood, we are led to considerations of their defining factors and to impinging biological forces.

The search for a physical definition to human experience will undoubtedly fail if we expect to isolate manipulable units in the physical environment. Experience is not delimited by the physical bounds of neighbourhood, family, social contacts, or the walls of a room. In fact, man's ability to experience a wide range and quantity of phenomena confirms his basic need for varied experience. Environments that are a product of a consideration of limited experiences of the individual may exclude environments that are richer and more fulfilling than what could be predicted.

Man has a basic need for varied experience (Fiske and Maddi, 1961). Tests on animals that were deprived of a stimulating environment in which they could actively participate showed that they remained physically under-developed (Gregory, 1966). But man's experience is not necessarily a function of a limited environment. Accounts of prisoners deprived of a rich environment tend to confirm these basic principles of atrophied mental and social development, though man is capable of providing his own rich, internal world, no matter what the sensory deprivation (Frankl, 1963).
The designed environment must begin to account for the basic human need for varied experience. A wide range of experience also provides one of the conditions for creativity. Creativity as the ability to react to a given set of environmental conditions, can only occur in a stimulating environment.

A variation in experience, or stimulation, occurs when the external environment changes or when the individual acts. The first is a factor that may be controlled by the design and planning professions. It occurs whenever change occurs, and whenever there is variety. The second is largely unpredictable but necessary for the individual to relate the environment to his experience of it.

Creativity is a result of a certain level of "arousal" induced by new experience. Three aspects of experience have arousing effects on an individual: intensity, meaningfulness, and variation. The intensity of an experience is often a quality of the environment that can be controlled externally. Meaning is attributed, no designed, and is chiefly the subjective response of the individual to the given environment. Meaning is in part an action of the individual within his environment. Variation of experience is also a factor that may be manipulated for appropriate levels of stimulation.

For any task, there is a level of stimulation which is necessary for optimal performance (Fiske and Maddi, 1961).
We say that an individual is in harmony with his environment when it is interesting but not painfully intense. The harmony may be struck by the ideal external environment, but more likely by the individual "screening" his perception of the environment, since we know that the need for stimulation varies with the activity cycle and with the individual. For the purposes of stimulating creativity in the environment, there is a preferred minimum level of environmental stimulation.

The smallest manipulable unit of the physical environment is really best defined by experience and creativity. It is that area which the individual can himself influence, whether in whole or in part. That portion of the environment which is a significant experience for the individual is also the area over which his creativity may operate. It is also the area which is best designed by an active participation of the individuals who experience it.

Environment, experience and creativity are closely linked. The environment is humanized through creative action within it. Meaningful change can only occur when experience is rich and varied. Varied experience is largely an attribute of the environment that can be manipulated at will, and partly a property of the individual response mechanism. The individual feels the greatest affinity for his environment when his
ability to act is limited only by his experience, his creativity, and his respect for others. His actions are most meaningful when his creativity is refined and stimulated by rich and varied experience.
CHAPTER 2: EXTERNALIZING CREATIVITY

2.1 Creative functions in Environmental Design

Creativity acts as the vital link between experience of the environment and meaningful activity within the environment. By instilling creative attitudes in individuals, the process of environmental design can be made meaningful as a major community activity. The degree of creative functioning can be indexed by perception, by idea synthesis and by production.

"The creative process is the process of change itself, of development, of evolution, in the organization of subjective life" (Ghiselin, 1952). It requires an active search for alternatives, and for the act of change. It proceeds from a dissatisfaction with the established order and reaches fulfillment in the attainment of a new order. The new order cannot be permanent but serves as a stimulus for further change. New orders may be externalized in the physical environment, in culture, in societal attitudes, or they may remain internalized in the individual. Regardless of their dimensions, the new orders can be seen as a kind of product, and as a catalyst for creative activity.

Creative production by a process of purely conscious calculation seems never to occur (Ghiselin, 1952). It has to
draw on the unconscious where the new order is developing. The acceptance of change is easier in the unconscious, for it is not inhibited by will and attention, though to surrender to the unconscious calls for purity of motive. The self-conscious design process in our society is inhibited by its formal, systematic structure, and largely fails to draw on unconscious information.

Creative results can be nurtured by more insightful thinking rather than purely systematic thinking, where the objective, problem and method are clearly defined. The systematic process is deliberative, methodical, even slow, the problem well within the range of abilities of the thinker, who is aware of logical relations between things. Trial and error are minimized. "The first stages of labour are like the last - constructive, developing, but also critical, reserved, cautious" (Hutchinson, 1949).

Insight and imagination are the result of free association. There will be unpredicted results, feelings of exhilaration, adequacy, finality. The sense of accomplishment is in the process. Systems are entirely product-oriented, and rely on the predictability of the final result (Boguslaw, 1965).

Many scientific discoveries have been described as the result of a chance insight, that proved later, through a systematic method, to be demonstrably true (Cannon, 1940).
Einstein proposed his theory of relativity in the near absence of verifiable evidence. In the fairy tale 'The Three Princes of Serendip' (Armeno, 1557, in Remer, 1965), the characters travel over the world, making discoveries quite by accident of things they were not in quest of. Hence we have the word 'serendipity' to describe intuitive findings or insights.

This process of 'discovery' describes an internal event, but its implications in the external environment are important counterbalances to the trend toward systems-thinking, systems-building, and systems-living. Plans are customarily evolved in this way, where the variables are kept to a few, and nearly everything is known before the process of planning even begins. Systems thinking advocates solutions while creative thinking advocates problem-solving.

The nature of the creative design process is in the information transmitted (aesthetic, quantitative, semantic), as well as in the process of transmission. Nevertheless, however valid may be the notion of the creative 'jump', the 'discovery', the primary process material must be made available in some comprehensible fashion. When a human being is exposed to a new environment, information is transmitted, as in all perceptual processes. But there are two important peculiarities. First, since the environment is produced by other human beings, and may reflect unfamiliar processes, there is information
transmitted from person to person through the environment.

Secondly, while we might expect that all stimuli will alter the individual's internal state, giving rise to new behaviour, this is not always so. Stimulus patterns may modify the thoughts, emotions and images of the individual, without giving rise to any action. In other words, in many situations, an environment will only stimulate an aesthetic response.

Aesthetic information is "patterns that cause an alteration in the human internal state" (Moles, 1958).

If we traced the information back through the environment to processes going on within the creator(s), we would find that these were themselves influenced by real events in the external environment. By definition, these events must be new or remarkable in some way, in order to catalyze conditions, or be perceived by anyone. This suggests a distinction in the types of information that influence the creator. Berlyne (1971) states that there is semantic information - social conditions, cultural and subcultural values - and expressive information, the latter being peculiar to the creator.

By inference, a proposed information centre would provide information of a social, economic, constructional nature, in addition to information relating to the creations, ideas, concepts and images of individuals.

Creative functioning in society in general, is an
emerging trend and points the way to a new environmental design process.

Tests of learning ability have shown that the individual is capable of assimilating and processing environmental information at a much greater rate than previously imagined (Freeman, 1968).

O.K. Moore has used a modified electric typewriter to show that preschool children can learn to read, write, type, and take dictation without having to undergo the traditional rote learning experiences. A much more ambitious environment has been created by Karlins and Shroder (1967) for the Inductive Teaching Program, a computerized technique which requires the subject to become an active manipulator of the informational environment and to utilize the information in that environment to come to conclusions and make decisions which are not pre-judged for him by external sources (p. 67)

An individual does not cease to grow when he reaches maturity, but the forces which guide this development come largely under his control. Secondly, developmental processes at work demonstrate the possibility of creative development of society in general (Gowan, 1972).

1) Accomplishment held tenuously only in conditions of peak experience or great mental health will in later development persevere and be present under conditions of more stress

2) Functions which emerge spasmodically or periodically at earlier stages may be performed more regularly at higher stages
3) Performance reached first by a few superior individuals in a culture will later be reached by more, and eventually, by the representative members of the culture.

4) What first appears as a phenomenon gradually becomes a norm.

Obviously, there are basic needs that must be satisfied before the individual can proceed to the creative state. The need for food, liquid, shelter, sex, sleep, and oxygen are easily satisfied, and even the needs for safety, belongingness, love and esteem are within the individual's grasp. The need for beauty is universal, and moreover is related to the individual's self-image (Maslow, 1962).

People learn to grow and create, by experiencing their environment and changing it. Even the flatworm learns from the structure of its environment. Job enrichment in industry provides us with numerous researches into creative processes in the environment. In the most extensive study of actual worker behaviour in a large-scale industry, psychiatrist Elliott Jacques found that workers responded strongly to environmental changes (Drucker, 1973). Examples in industry and business show that raising the creative challenge of work improves job satisfaction and productivity. The individual in becoming an active manipulator of his own
environment strengthens the manager-worker relationship since he will be more receptive to the knowledge he needs to carry out his task (Goble, 1970).

Planning has been preoccupied with the fulfillment of basic needs and little more. This is in keeping with the early Behaviourist theory that the individual seeks an equilibrium, seeks to reduce tension, and that most behaviour can be defined in tension-reducing terms. This is tantamount to saying that human beings do not grow psychologically, and therefore do not create.

Creative functioning in individuals is largely informal and unstructured though the primary processing material in the environment can and should be structured to aid creative design. Creative functioning in the whole of society becomes increasingly important as the phenomenon of creation becomes the norm.

2.2 The Functional Significance of Environment

A meaningful environment is one that responds to purposeful human action. It is not necessarily an environment that fulfills human needs, or bears the signs of a cultural archetype. Meaning only obtains through human intervention, through change itself.
As adults we are quick to forget the richness of childhood experience*; we hardly know of the existence of the inner world of dreams; as for our physical experiences, we retain just sufficient proprioceptive sensations to coordinate our movements and to ensure minimal requirements for survival. Most important for creativity, our capacity to think is limited to self-interest and common sense, so that our ability to perceive is also eroded.

Modern psychology has made it clear through a number of approaches that the failure to realize one's potential can be traced to a constricted, authority-ridden, mechanistic world (Laing, 1967; Maslow, 1962; Fromm, 1941). The efforts in child education cited in Chapter One do not strike at some of the basic untenable structures of our society. The emphasis on child education does not acknowledge the fact that individuals can remain creative throughout their adult years.

Many of the ills of the urban environment can be traced to developmental problems of the individual. It may be true that the present physical setting may in part constrain the full development of the individual, and this thesis assumes that the environment may be manipulated so as to provide greater opportunities for responsiveness in individuals. Changing the functional significance of the environment, rather than the

*Children in creative play often create their own environments or adapt an existing environment to the purpose. Their creativity is almost always in the form of improvisations of environments and actions.
visual appearance, is the true aim of urban design.

By functional significance is meant the meaning of the environment in terms of its purposes, the activities it promotes, and the attitudes it fosters in individuals. Rather than reforming the environmental aesthetic, we can manipulate functional meaning by varying the rate of change, promoting different activities, and the design participation of individuals. Limiting the rate of change while designing aesthetically pleasing surroundings is one way of providing an individual feeling of security. Allowing the rate of change to vary with the individual's ability to act upon his environment, is another.

This theory does not accept that the environmental ills will be solved by administrative action, though administrative changes may be involved. There is a need for a creative design process, peculiarly adapted to the city and internalized in every one of its members. This is not essentially a concern with biological process over which the individual has little control, but with cognition, a process over which the individual has almost unlimited control.

For the manifold purposes of planning, the 'person' we are speaking of can be understood in terms of experience, as a centre of orientation for the objective universe. Personal experience transforms a given field into a field of intention
and action: only through action can our experience be transformed, and the environment take on new functional meaning.

Creativity, in the environmental context, becomes a practical tool for planning life and setting. It is a humanist approach to the problem of psychological response to physical situations, and encompasses modern trends in psychoanalysis, and in understanding behaviour.

To this point we have emphasized the dynamic, changeable qualities of a responsive attitude to environment. The individual was seen as a kind of receptor of images and ideas, a processor of information. It is not simply a matter of perception, or response to need, that motivates the individual, but a complexity of cognitive function, ways of learning and perceiving, coupled with personality.

Security is an important element in psychological needs, and will no doubt continue as such in the future. The dynamism of a perpetual reactivity to internal and external conditions, is itself the assurance of security. The very nature of a reactive process, provides the secure knowledge that every environmental change will have a human motivation. The individual has the option of adapting to the new condition created by himself or others, or generating an alternative condition. The options can be made available by planning environments with functional flexibility, with opportunities
for experimentation, with making visible the process of change itself.

A second important means of providing security is the symbolic element, what is meant by the functional significance of the environment. Creativity implies a search for meaning in everyday experience, and attempts to make this meaning explicit or visible. Symbols serve us as points of stability, of mental rest from change and upheaval (Koestler, 1964). Arnheim (1954) states that all art serves in a symbolic way, by symbolizing general needs or experiences, through the peculiar power of the artist.

The Webster Dictionary definition includes the following senses of the term 'symbol':

something that stands for or suggests something else by reason of relationship, association, convention or accidental but not intentional resemblance; especially a visible sign of something that is invisible; an object or act that represents a complex through unconscious association rather than through objective resemblance or conscious substitution.

The last appears to be most congruent with creative processes, and in particular, design generation. The creation of significant symbols in urban life is essential, both to the satisfaction of basic aesthetic and security needs, as well as to the act of creation. "Symbols are the instrumentalities whereby men codify experience, or create a map of the territory of experience" (Hertzler, 1965). Intentional physical symbols
must first be realized and then undergo a period of reaction before they may become significant. Physical structures do not have meaning without human intervention after creation.

Much more can no doubt be said about the individual's experience of physical space and how this may result in the creation of significant symbols, the key elements of personal stability. It is perhaps more useful to a theory of creative planning to note how individuals use significant symbols in their own creative production. A knowledge of the significant aspects of perception that influence creativity, will aid designers in choosing aspects of the environment for study. Holt-Hansen (1971) has carried out a series of experiments concerned with form creation. For example, he asks a group of subjects to place three unpainted wooden bars on a black surface, so that the figure formed appeared to the individual "to possess the maximum degree of beauty". An analysis of the patterns and statements by the subjects suggest three working methods by the participants:

a) 24 of 48 subjects created their forms under the influence of "dynamic forces and movement"

b) 11 of 48 subjects created their forms under the influence of "ideals, ideas, and fantasies"

c) 13 of 48 subjects created their forms under a combination of experiences.
A significant portion of an individual's creation could thus be interpreted as the result of the operation of symbols, representing environmental experiences. Carl Jung (1964) corroborates this use of symbols in idea formation. Furthermore, it would seem that the chief content of dreams and subconscious thinking is in the form of symbols; that is, everyday objects and experiences are transformed and animated so that they influence all our other ideas and actions.

Symbolizing may mean the spatial reduction of situations in an analogical form in order to manipulate them (Sivadon, 1970). Drawing a blueprint, writing a programme, means reducing to manageable dimensions the complexities of a whole development of actions so that they can be inspected with a single look.

Spatial usage and analogical reduction constitute frequent defenses of the personality against anxiety, and they are also found in the failure of these defenses (Sivadon, 1970). The use of symbols might then justifiably be used as a method in anxiety reduction for creativity.

People have always tended to "forget themselves" by changing their spatial environment, and also by investing their anxiety in creative activity. It is a question of transforming one's relation with objects and people by manipulating or transforming the objects in such a way as to express the subject's problem in an analogical form communicable to others.
This is the process at work in amateur photography, in published sketchbooks of cityscapes, in postcards, travelogues, all of which are representations of the environment in reduced terms.

The object becomes a symbolic mediator. For the creator, it represents anxiety itself from which he has been freed; for the others, it evokes on a symbolic plane, an analogous, though attenuated feeling. Thus the symbol behaves like an absorbent screen that retains the anxiety and lets filter through the meaning or information.

The important psychological effect of these processes is to establish a capacity for autonomy with the individual. Psychological distance from the environment established through creative work is associated with creativity. It is not true, however, that psychological distance itself, has any particular bearing on the security need. What is important here is the establishment of a feeling of autonomy, of comprehension, and security with respect to the environment, including the cityscape.

But direct manipulation of the environment should not be downplayed in favour of analogical reduction. The danger is that we shall be reduced to passive observance of the life around us, perhaps through the viewfinder of a camera.

It is only through the communication of significant symbols that society can continue to exist and recreate itself.
The appeals to public symbols must be launched on an unprecedented scale as the size and diversity of the audience and the environmental scale, increases (Duncan, 1968). The media are instrumental in conferring meaning on the environment through symbol-making. The fundamental principles of social and spatial order are learned via movies, radio, television and the popular press. This is the great power of the media: the accelerated generation of issues and ideas which quickly translate through symbolic form in the individual, hopefully to personal action. Meaning is not derived through the passive observance of phenomena, or the passage of information, but through identification with community life. Creative potential is inherent in this primary process material—the significant symbols.

The accelerated and indiscriminate generation of such symbols is not typical of a traditional symbolism. Wenceslas Square in Prague had achieved over centuries, a venerated and patriotic symbolism. The coverage of events associated with the Square in the 1967 invasion and purge, transformed it into an even stronger symbol in a matter of days. But the mass media also generate the bastardizations of traditional symbols, kitsch, glossing over the true meanings of things with a thin icing of sentiment or humour (Dorfles, 1969). The education and sophistication of a selective and creative society will counteract the tendency toward cheap imitation, and popular
taste will undoubtedly take on new meaning. Greater selection of, and access to, information through the media will create a better exercise of choice and symbol usage.

The environment must become meaningful as the primary resource material for design. A selective process of education, information collation, and symbol-making by planners and the mass media will make the functioning of the environment significant and available for design purposes.

2.3 Inferences for a Creative Urban Design Process

Our contemporary culture is burdened with a conscious design process. Master craftsmen control the form-making activities, which are characterized by the wilfulness, inventiveness and individuality of the designers. Feedback to design is indirect and delayed, if it occurs at all. The consciously designed environment is almost never reviewed by its designers. Social and administrative channels which would allow us to learn from environmental errors, are non-existant, making design into individualized, random action.

Present-day design problems steadily increase in quantity, complexity and scale, while materials, technology, social structure, and the culture itself change faster than
ever before. While the functional complexity of the world increases, the design process is characterized by increasing simplicity. A small group of designers become responsible for an increasing proportion of the environment. The form-maker, faced with such tasks as designing complete environments for millions of persons, is overwhelmed by the flood of specialized information delineating his design problems. It is becoming exceedingly difficult to achieve a good fit between need and environment with present-day design methods, at the present-day scale of design action.

An apparent solution to the conscious designer's dilemma is to achieve formal communication channels between designer and user, between designer and environment. Formal communication links such as administrative channels, questionnaires, surveys, interviews, published information sheets, public meetings, television broadcasts, etc., provide the greatest range of information that a designer can assimilate and use. A greater depth and breadth of information is constantly disseminated in society through informal communication channels. The media of communication are roughly the same in both cases - popular literature, the press, television, radio. The information in the unselfconscious design process is informal since it influences responses to environment while it seldom influences design of the environment.
Three important distinctions make the unselfconscious information network a viable alternative in the present:

1) Because the links are informal and constantly changing, the unselfconscious information network is essentially analogous to the creative process in the individual.

2) Because the information is universally available, the potential exists for every individual to become a designer, an active manipulator of his environment.

3) Because there is no time lag between information input and synthesis, as there is in the conscious design process, design is an immediate response to environment.

The individual creative process provides us with the rudiments of a successful design process for the environment. In order to foster a creative design process, we must foster creative attitudes, provide problem-solving situations in the environment, and make design information meaningful.

The universal accessibility to environmental information makes every individual a potential designer. This means a return to the unselfconscious design process that existed before the rise of the professional form-makers. The possibility exists then to re-integrate man and environment, experience and behaviour, art and life. The environment and the individual are guided by meaningful information gained from a process of interaction.
The third distinction between the selfconscious and unselfconscious design processes, has important implications for the nature and scale of design. The conscious design process relied on the predictability of its actions, and the resulting environments were often rational projections into the future. Design became a highly specialized activity, and in attempting to deal with broad environmental factors, urban design became a logical extension of building design. The scale of activity grew enormously. Because of the instantaneous nature of the information structuring in the unselfconscious design process, the ability exists for each person individually to proceed on an incremental, ad hoc basis with a reasonable assurance that the resulting design will fit his own requirements. Technology is preparing the way for a small scale, ad hoc design process.
CHAPTER 3: CREATIVE ENVIRONMENTAL ATTITUDES

The selfconscious design process attempts to create an ideal product through systematized, formal methods. The unselfconscious design process seeks to make every action in the environment meaningful, through a creative information and design process. The selfconscious places emphasis on the result, its purpose, its aesthetics, its success in fulfilling explicit needs. The unselfconscious places emphasis on the experience, its stimulating or moderating qualities, its ability to elicit further creative activity, or satisfaction. The unconscious design process accepts that satisfaction is not necessarily a fulfillment of basic needs, but that it involves a complexity of experience. The individual is seldom preoccupied with the pursuit of basic needs; but rather

the mind seeks to escape from the certainties of the diffuse light that remains during stimulus deprivation. It is bored by the certainties of any humdrum job or routine entertainment. It seeks out the single moving spot on the landscape or the tiny squeak in the engine. It plays the slot machine to exhaustion, hoping for the rare and unpredictable payoff when three lemons turn up. What it seeks in the variable light signals, and what it processes and responds to on all levels, is information - the changing, the novel, the surprising, and the uncertain (Held, 1961).

Every design action is significant as an arousal-increasing device or as an arousal-moderating device. Arousal is a psychological condition that acts as a contingency for creative
human activity. The sections of this chapter describe the various aspects of the environment that lead the individual to "arousal" and possibly to design decisions. In considering the perceived environment as a set of preferred stimuli (rather than the Behaviourist view of environments as determinants of activity), it is possible to reflect the social and cultural milieu in physical design. By attempting to elicit responses from the person in the environment, we are actually seeking to transform the environment into the major object of our creative activity. Creative action, too often relegated to the artist's studio or the upper echelons of the business world, then becomes a universal, daily occurrence.

The capacity of cities to generate creative response has varied with the time and culture. According to the criteria on the following pages, we can suggest that the arousal-raising capacities of art and architecture are markedly greater in Islam than in China and Ancient Greece. In the West, the Gothic, Baroque, and Romantic periods showed a tendency toward creative arousal while the Romanesque and Classical periods were low in this capacity. The nineteen-forties', 'fifties, and 'sixties showed a growing tendency toward arousal-moderating influences. The classical design tradition of recent decades is breaking down, however, as more complex, dynamic design traditions return: regional architecture, Art Deco, Moderne.
The environment conceptualized in this chapter does not consist of simple orders, consistent patterns, hierarchically organized spaces, or clearly defined areas. These describe an essentially arbitrary, consciously conceived design, and an externally imposed order. Rather, the environment must invite the internal ordering of design on the smallest scale, namely, design by the individual. Design, regardless of the source, must proceed from environmental contingencies. In this chapter, the environment is characterized by attitudes or attributes: conflict, ambiguity, complexity, novelty, and expectation. These attitudes engender conditions of uncertainty or arousal, that are associated with creative production by individuals.

This thesis accepts the modern environmental condition to be characterized by a growing state of flux. Change is almost a way of life. Meaningful environments can be created by incorporating the arousal-increasing conditions precedent to creative activity. If an increasing rate of change is to be made acceptable, we must generate problem-solving conditions in the environment. This means enhancing the creative conditions of the environment, and providing opportunities or outlets for individual design action.

The following is a list of creative, environmental attitudes which are like to conduce toward creative solutions:
3.1 Conflict

Conflict is said to occur whenever processes are initiated in the brain that drive the individual toward different and mutually exclusive forms of behaviour (Berlyne, 1971). Any new or surprising stimulus is bound to cause conflict since it is different from the response that was held in readiness for an event that did not materialize. These are the difficulties inherent in information-processing of any kind. In the environmental sphere, we may include the preceding notions of novelty and violated expectations, as conflicts arising from some consecutive order of events.

Lukaszewski (1970) corroborates this in stating that conflict is simply an incompatibility of information. He suggests that all activity is motivated by the incompatibility between two systems of information describing the same state of things. Not only is conflict necessary to creativity, but it is necessary to action of any kind.

Conflict is an essential attribute of creativity, and is not only a psychological condition precedent to creative action, but is a condition of the product itself.

Every artistic product conceals within itself an internal conflict between content and form, and it is through form that the artist achieves that effect that the content eliminates, or as it were, extinguishes (Vygotski, 1965).
The most important response mechanism to conflict stimuli is the adaptability of man. Whether the disturbance is in the individual's society, in the physical environment, or in his own psychological growth, his ability to adapt will determine his health and survival. Claude Bernard first recognized that health depends upon the ability of the individual to maintain his internal condition in an approximately constant state, despite the endless and often extreme variations in the external environment. "The fixity of the milieu intérieur is the essential condition of free life" (Bernard, 1937).

Many would argue that a discussion of conflict and adaptation is academic in a world in which man can almost orchestrate at will the nature and intensity of the stimuli he receives from the external world. It is true that man with his technological extensions can not only form his entire immediate environment, but he can also control his responses to it through the use of drugs and conditioning. Most of our technology has been directed toward the elimination of stresses and difficulties, to the extent that this is almost the operational definition of technology. The avoidance of stresses may itself constitute a kind of threat to health, because the body and the mind are geared for responding to challenges. Human history shows that the same kind of knowledge that permits man to alter his environment for the purposes of minimizing effort, achieving comfort, and avoiding exposure to stress also gives him the
power to change his environment and ways of life in a manner that often entails unpredictable dangers (Dubos, 1965).

Adaptation of one's surroundings, as opposed to adaptability as a human trait, is liable to cause grave difficulties in the changed environment of tomorrow. Adaptability is essential in conditions of rapid change.

Adaptability in the individual is also essential to creative response. In part, our ability to adapt can be improved with the selective design of stressful conditions. At the same time, the stresses and conflicts themselves can be a source of creativity. The tragic figure of Van Gogh certainly demonstrates that creative genius can prosper because of, or in spite of, enormous psychological burdens. In the most repressive and stultifying of societies, great works of art continue to be imagined and produced. We can state with some validity that a stressful, conflicting environment is more conducive to creativity than a stress-free one, if we take responses such as curiosity, desire for change, and increased activity to be creative. Experiments have been conducted to test the effects of stress under conditions of overstimulation, understimulation, uncertainty, and novelty (Frankenhaeuser, 1972).

In situations in which the individual subject acted as a passive recipient of stressful influences beyond his control, the emotional responses increased with stress. When the subject
actively tried to cope with the stressors, his success alone
influenced his emotional response; and this was invariably
achieved at an intermediate level of stress.

While a certain level of stress may be desirable, there
are obviously facets of conflict which are preferable to others.

Situations which make demands on people establish a
quality of stress, that may or may not be desirable, depending
on whether or not they are soluble (Halprin, 1968). Soluble
problems, as positive conflict, can be created through
the provision of alternatives, by "demanding" the exercise of
choice. Conflicting relationships, as new experiences, are
positive if they are of a general, and idea-generating nature.

The kinds of conflicts one chooses to discuss may be
instrumental in deciding whether desirable responses result.
We are only too familiar with the ecological conflicts
seemingly out of control in large cities - traffic congestion,
excessive noise, destruction of the old in an era of impersonal
change, etc. None of these serious problems seem to respond
to human intervention or emotion, and thus resist the natural
human tendency to challenge conflict and learn from it. A
useful type of conflict is associated with dynamic, flexible
environments where individuals have the opportunity to react
to conditions and to change them as they become apparent.
The conflicts of interest, and the conflicts in use have a
beneficial quality if individuals may be actively involved in their solution.

Symbolic conflicts already occur in cities where a pluralist outlook is the salient feature of the design process. A great variety in the size of buildings, in their age, and in their arrangement create an impression of conflict and dynamism. A building cannot always be in aesthetic and functional harmony with its environment if the discordant and conflictive nature of change is to be apparent and comprehensible.

An apparent conflict might be the introduction of housing into the urban core. One can recite the difficulties that come immediately to mind: the problem of noise, of safety for possessions and children, the market bias toward business, the lack of support services, etc. The ability of the planner to set the conditions for the success of such a plan is the crucial test of his usefulness in a creative context. The abilities of individuals are enlisted in the adaptation of the living environment to a working environment, and in making the inner city a home. This introduces the individual as a designer in an environment that is presently the home ground of professionals. Such conflicts must occur as a matter of course in the city, as problems that have many and varied solutions. The problems that beset a creative design process must never be so great as to preclude the inception or encouragement of
any such project.

The existence of ecological and financial problems is perhaps the best indication that the environment has become too specialized, and no longer contributes in a creative capacity.

A great deal has been said about the natural conflict of cars and pedestrians, with the result that the separation of these activities is often offered as a solution. The discomforts of noise, of noxious odours, of excessive speed and crowding have been cited as negative aspects of the vehicle-pedestrian combination. Yet some of these same characteristics describe a busy market where people gather voluntarily and enjoy the experience of crowding and noise. The quality of the experience, the psychophysical aspect, is desirable but the ecological conflict is not. The streets of London were not more quiet and pastoral in the years preceding the advent of the automobile than after. There is no easy solution to the real dangers that may be present in the ecological conflict of cars meeting people. But the noise and confusion of a busy commercial street may be a source of excitement and creativity to even the casual observer. In any crisis the individual knows he is still alive by the quickened pulse of his heart; so it is perhaps with the city, where movement of any kind is visible proof of the life-blood of its existence.
3.2 Ambiguity

The interpretation of an experience of the physical environment has been discussed under the general title of expectations. Beyond these projections into a future state that are the result of experience, we can identify the important role in creativity played by multiple meaning, or ambiguity. Several types of multiple meaning have been identified (Kris and Kaplan, 1948): 1) disjunctive ambiguity: there are several alternative and mutually exclusive meanings; 2) additive ambiguity: the meanings, while mutually exclusive, overlap to some extent, e.g. they vary in breadth; 3) conjunctive ambiguity: "the several meanings are jointly effective in interpretation"; and 4) integrative ambiguity: the manifold meanings evoke and support one another, so that they interact to produce a complex and shifting pattern.

Venturi (1966) has proposed that ambiguity is essential to architecture, and is the result of oscillating relationships between contributions of elements to "form and structure, texture and material". In a complex architectural structure, there may be a conscious attempt to confuse experience, promote "richness of meaning over clarity of meaning". Some of Venturi's examples illustrate disjunctive ambiguity. He discusses buildings in which it is not clear whether the plan is square
or not, whether pavilions are near or far, big or small, whether we are looking at two buildings joined or a single building with a split. Architectural examples of conjunctive ambiguity seem to be more numerous. There is sometimes a duality in the relation of a part to its surroundings. A building or scene can be viewed with entirely different results from different angles; an effect particularly evident in Mediaeval cities where the plan constantly varies. Irregular lots contribute to perceived ambiguity by forcing an irregularity of building plan and hence of the perceived profile and density.

Multiplicity of function is an important ambiguity both historically and in our time. The Ponte Vecchio in Florence serves both as a bridge and as a street lined with shops. A gallery may function both as a room and as a corridor. Before the advent of the nuclear family people lived in houses in which rooms had no designated function. Even in large manorhouses, one adapted the room at hand to the purposes in mind (Ariès, 1962). Today, the strict designation of use in buildings is breaking down with a world-wide housing shortage. Dwelling units are smaller, with fewer room divisions, and families soon learn to adapt one room to several functions. Flexibility and ambiguity of function is especially evident in modern office buildings, where open plans invite some creative input. Renato Severino (1970) presents a picture
of a world in which industrialized building systems will standardize the components of a building structure. The components may be arranged in innumerable ways, each serving many functions and in this way frustrate interpretative understanding. Buildings and spaces would thus be completely ambiguous in meaning and use.

Camillo Sitte (1965) recognized long ago the fundamental failure of the new Industrial Age squares in Europe and North America. Based on an orthogonal grid or circular plan, public squares came to be rigidly defined in space, the leftovers of efficient development. Traditional squares, varied in shape, size and extent, were much more successful on human and aesthetic grounds. This may be partly due to the undefined, ambiguous quality of the space, i.e. What shape is it? How far is it to the other side? Where is the end of it? Where is the beginning? What is the purpose?

The Boston Common has been identified as a classic case of environmental ambiguity (Lynch, 1960; Stea, 1969). The Common is five-sided, with each side appearing to meet at right angles with the two sides that join it. Although the angles vary, it is difficult for the traveler to avoid the assumption of a square, because of the Common's width and abundance of trees, limiting visibility across it. Lynch found that many Bostonians had difficulty relating the surrounding
streets to the Common, although the Common itself was often the core of their mental map of the city.

A large, planted open space bordering the most intensive district in Boston, a place full of associations, accessible to all, the Common is quite unmistakable. It is so located as to expose one edge of three important districts: Beacon Hill, Back Bay, and the downtown shopping district, and is therefore a nucleus from which anyone can expand his knowledge of the environment (p. 21).

The ambiguity of the space does not detract and probably contributes to the Common's psychological importance to Boston.

Besides these symbolic meanings that one discovers in buildings and spaces, one is also struck by the sense of authority or territoriality conveyed by a place. Territoriality as a conservative and inhibiting force in man may repress creativity. Its purpose is not to break down symbolic barriers, but to define and limit space. Territoriality can best be controlled by designers in public spaces.

The rise of the building landscape tradition in nineteenth century America was in this sense an unfortunate development in the urban context. Architects became concerned with the picturesque settings for their buildings and attempted to link setting and building psychologically and physically. The landscape was planned and transformed in minute detail to complement the new structure in its midst. This gave the
landscape the permanence - one might say intransigence - and aloofness of the building itself. This imposed arbitrary restrictions on the use and subsequent transformation of the space by its users, and expanded symbolic authority from the building to the environs.

Alternatively in this century, the building was designed to complement, or fade into the landscape. In the city this meant that a new building had to fit the design pattern of the street, so that it would not obtrude, or appear as a new idea. In the suburban and rural contexts, buildings disappeared into the rocks and beneath the earth, as if to deny the real difference in urban and natural environment-building. In subduing or concealing its presence, the building conferred on the surrounding landscape certain values and symbolic authority. The landscape thus became permanent. Meanwhile the wymbolic value of the building both in the urban and suburban contexts lost its meaning. There was no incentive, other than passive observance, to be in public places and contribute one's own creative input.

Ambiguity of use and authority can be planned into the environment. This may be accomplished by avoiding the 'total design' of open spaces, by allowing open spaces to penetrate private property, or private development to penetrate public space. Authority should not always be clear. In the
Mediaeval town, there were many and varied types of ownerships and leases. In our time, new types of leases should be instituted to permit multiple authority over physical space, the weakening of the 'property line' syndrome. Public and semi-public space is the most vital area where individuals may confer status and symbolic authority by designing it for some purpose.

3.3 Complexity

The movement from a view of life as essentially orderly and simple to a view of life as complex and ironic is what every individual passes through in becoming mature (August Heckscher)

Complexity and contradiction have been acknowledged in almost every field including the sciences, but significantly excluding planning and architecture. For example, the origin of the universe has never been resolved by scientific theoreticians, and most acceptable theories incorporate complexities and contradictory ideas.

It is only within the last decades that we have begun to recognize the complexity and relative nature of experience. The imposed orders of architecture and planning are the abstractions of the drafting table and power politics.
There is much evidence to suggest that the abstruse and abstract concepts that are employed in forming the physical environment have little or no relation to experience (Venturi, 1971). Meaning is filtered out by the "purification" of forms, the denuding of buildings, for the sake of personal expression or behavioural functionalism (Venturi, 1966).

A complex structure is one which contains a large number of independently selected elements (Berlyne, 1971). The architect may accomplish this kind of complexity through ornamentation, embellishment, or the play of many forms that connect but are not contained. The artist will introduce variations on a theme, or add elements to a basic pattern.

Such artistic products are the result of a high level of creative involvement with ideas. A similar feeling is induced in the observer confronting the work of art for the first time. Through the use of chequerboard patterns, R. M. Nicki (1972) showed that subjects became most aroused at a high but intermediate level of chequerboard complexity. They also preferred that level of complexity to others, as being the most aesthetically pleasing.
3.4 Novelty

When new objects are in themselves indifferent, the efforts that are necessary for conceiving them, exalt and enliven the frame of the mind, make it receive a strong impression from them and thus render them in some measure agreeable.

Gerard, *An Essay on Taste*

Anything that strikes the individual as unusual qualifies as a novelty, but it is only relatively different from everything else he has experienced. There is no such thing as experiencing something that has no relation to any previous experience. It is possible to come across a shade of colour or an odour for the first time, but it must be possible to locate it among others that are well-known; that is, it is perceived as a combination of familiar colours or odours.

The case may be made that permitting novelty in the physical environment is capricious and indefensible over time. The feeling of having encountered something new need not be transitory. In nonaesthetic surroundings, something with a striking difference can provide lasting satisfaction to the individual, just as an oil painting serves as a long-lasting diversion for the office worker in dreary surroundings. Novel experiences can be lasting for individuals may renew them again and again.

Novel elements in the environment may be uneconomic,
but their psychological important may very well outweigh monetary considerations. A street that takes an unexpected turn or suddenly becomes narrow causes some problems for simple efficient development of properties and for the movement of traffic. However, the novelty of such an occurrence may be sufficient stimulus alone for the unique development of a shopping or housing area.

By-laws that are universally applicable will rule out novel events, unless planners can seize a unique opportunity, or permit a novel infringement of the law. A building that is not set back from the street in an area where setback requirements are uniformly observed, is a kind of novelty. It ceases to be novel when there is no general rule to break.

Novel variations in the environment may be the left-overs of a time of no regulation, or the survivors of a systematic check by zoning officers. In these cases, the work of the planner will be involved in the preservation of these physical oddities. In the heavily regulated present, the planner himself must institute idiosyncracies into his physical plan.

For instance, an effort has been made to make the inner city somehow similar to suburbia or vice versa. This has been attempted through the introduction of pastoral elements such as treed pedestrian malls, and suburban style shopping centres. One of the advantages of the workplace separated
from the home, is its difference in quality. Different activities require marked changes in ambient characteristics of the setting.

The designer must consider a sudden change in scale, in colour, in street pattern as a means of introducing novelty. A black tower in an area of light-coloured buildings, or a curving street in a rectilinear plan have a similar effect; they require psychological adaptation by the observer.

The strategy or purpose for these actions is not explicit, as in other planning decisions, but implicit. That is, an expressed need is not satisfied, but potential creativity is nurtured. The psychological effect of arousal, leading to some creative response, is all-important.

3.5 Expectations

With a low and rhythmical movement it led him here, there, everywhere, towards a state of happiness noble, unintelligible, yet clearly indicated. And then suddenly, having reached a certain point from which he was prepared to follow it, after pausing for a moment, abruptly it changed its direction, and in a fresh movement, more rapid, multiform, melancholy, incessant, sweet, it bore him off with it towards a vista of joys unknown (Proust, A la Recherche du Temps Perdu)

As an important part of the human need for security, we constantly anticipate the experience of the next moment,
what is likely to come next. Our behaviour depends not only on
the form the stimulus takes, but also on the form that it was
expected to take. If in fact our expectations are confirmed,
perception will be facilitated.

This is closely related to the idea that making the
city observable or comprehensible visually, makes for fulfilled
expectations (Wurman, 1971). This is accomplished through
raising expectations of a certain activity or building form in
an unseen part of the city, and then fulfilling those expectations.
A tourist guidebook has much the same effect. A preconception
of the area is implanted in the individual, which is then
confirmed in reality. A slight discrepancy between the expectation
and the reality may alter the person's perception slightly,
or he may be disappointed or confused.

Posters and other references depicting an historic area
of the city and how to reach it have the effect of raising
expectations, but also, define the historic area, package it
for inconspicuous consumption. In this sense, the expectation
is really a new consciousness about an area.

For the purposes of creative response, it is usually
desirable to violate expectations to some extent. This can be
accomplished by introducing the element of surprise into a plan.
By this we do not mean novelty, for the psychological effect of
novelty is usually different from that of surprise (Home, 1765).
This often occurs without formal planning, through the juxtaposition of elements that would not normally be placed together. Because the unusual element violates the expectations of the individual, he is forced to look at it in a fresh way, unclouded by preconceptions - "reculer pour mieux regarder".

Surprising incidents can create much of the appeal of stories and plays. Painting and sculpture often incorporate incongruities in order to violate expectations, and pique the interest of the spectator.

In the physical environment, movement has much to do with expectations. In the contemporary ethic, planners try to accommodate changes in activity or atmosphere by making them gradual. The "slow-fast gradient" of traffic movement for example (Alexander, 1968) describes the situation in which the speed of movement is gradually altered as is the ambient level. In reality, harsh contrasts are the rule rather than the exception and seem to be a desirable condition in most established cities. Sidewalk cafes on busy streets have this effect. A steel-and-glass building amid old stone and brick warehouses is an inspired violation of expectations. The conversion of warehouses to fashionable shops and residences, of defunct factories to restaurants, of homes to workshops and workshops to homes, all have a similar psychological effect; viz. taking activities and places out of their traditional
The notion of building up expectations and then noticeably departing from them is the principle behind creative response through the manipulation of variety (Rapoport and Hawkes, 1970). An expected result at the end of a street may be violated when the traveller arrives there; for instance, a facade would suggest a right-hand turn but upon reaching the end of the street, the driver discovers he must go around the building.

![Diagram showing expectations fulfilled and expectations violated]

The intent of the planner need not always be made explicit, or all the consequences anticipated. The opportunities should be abundant throughout the city for creation within the limits imposed by the planner. Limits, if only in the form of zoning standards, are necessary to any successful creation, and to cooperation by large numbers of people.
These environmental attitudes are offered as the essential conditions for creativity. Design that attempts to induce these values, deals directly with the problems of change, instability and insecurity, by inviting purposeful, individual involvement in the process of change.

In this chapter we have not attempted to put limits on these attitudes, but it is recognized that they have optimum operating levels. As stimuli, these attitudes evoke the so-called "orientation reaction", or if they are extremely intense or novel, the "defensive reaction" (Sokolov, 1958; Berlyne, 1960). Moderating devices maintain complexity, conflict, ambiguity, etc., at low levels.

These sorts of actions lower the arousing potential of the environment:

The designer can 'miniaturize' through historic preservation, local-area, or neighbourhood planning, beautification, the 'streets are for people' mentality. He can subdue the intensities of experience by spreading out activities, separating functional areas of the city, homogenizing, and simplifying. His structures can be simple, evident in such urban designs as the orthogonal-modular, concentric and Baroque city plans, and the "access-tree principle" (Okamoto, 1969)
of movement. He can set up clear expectations that are fulfilled in some other part of the design, by making direction and destination legible, by making signage monumental (Venturi, 1972), by "making the city observable" (Wurman, 1971). He can conform to rules restricting the kinds of elements and combinations so that the individual observer can recognize redundancies, both distributional and correlational. For this strategy, there is zoning, and the aesthetics of Las Vegas, Times Square and Park Avenue.

Unity demands that conflict be resolved and reintegrated by dominance, the principle of synthesis. This integration is effected subordinating competing visual attraction to an idea or plan or orderly arrangement (Graves, 1951, p. 112)

The designer can also attempt to slow the rate of change, and introduce low variability in place and time.

All of these activities have the effect of creating an apparent, external order, and describe the selfconscious design process. To an extent, these are the ongoing designs of the present-day, anathema to creativity. This thesis presumes a necessary shift from this moderating stance to the creative attitude stance in urban design.
The first two chapters stressed the necessity of individual involvement in creative processes in order to permit the individual to interact with his environment. By 'process' is meant psychological changes, new or unanticipated experiences, that may result in design changes in the physical environment. An essential requirement for these design processes is a certain psychological condition including aspects of conflict, expectation, ambiguity, novelty, and complexity (Chapter 3); based on the hypothesis that these conditions are most conducive to creativity. These psychological states can be induced by introducing analogous situations to the environmental context. While we know little about the way in which an individual may react or behave to a given set of stimuli, aesthetic theory tells us much about how the stimuli are perceived. We know that certain environmental conditions are like problem sets - difficulties in movement, obstacles to perception, the creation of stress - and through their solutions lead the individual to new experience. The behavioural or creative end-products of this experience are most difficult to define or predict, and are not integral to creative fulfilment. A confrontation with new experience may result in a number of somewhat unpredictable responses including outright rejection, a change in attitude, a change in behaviour,
or some creative action. The results are spontaneous and personal, and demonstrate the reconstitution of behaviour and experience through the process of creation. This is how the physical environment is made meaningful.

4.1 Determinants of a Creative Plan

A corollary to this theory of creative psychological states, is planning action that best fits the requirements of the individual in his environment.

Successful creative planning must include the following characteristics for design purposes: flexibility, continuity, and contingencies.

Flexibility: Any plan or design must facilitate its adaptation to the needs of the users. These needs are a sphere of influence that only the users themselves can properly define and fulfill. Successful flexibility in a design may exhibit the characteristics of ambiguity, since multiple or flexible usage means that purpose will not be clear. Flexibility does not mean an anticipation of all the uses of a thing, but simply leaving the design open-ended. Changes in pattern or motif make it clear to the user community that idiosyncrasies can be accommodated. Changes in the direction of movement in a
city make it clear that there are many ways to orient one's activities and build infrastructure. Variety connotes the presence of flexibility in planning, though it is not in itself the limit of flexibility.

Continuity: All changes must physically demonstrate that they constitute an uninterrupted sequence of events. This is a necessary condition for the types of creativity that implicitly assume that something new proceeds from something existing, and that new ideas proceed from the presence of the historic gamut. Besides continuity in time there is continuity in place, where the traditional forms of an area can be strengthened and act as a source of inspiration to others (Rodighiero, 1965). Continuity in architectural tradition as opposed to imitation, can be a creative response to the existing environment. Continuity is seen here as an ordering influence on the mind, but assumes that change is integral to continuity.

Contingencies: Ideally we would avoid problems by forseeing them. Short of this we often apply a rule or principle and use a logical, systematic method to arrive at a solution to a problem. But this is not a creative use of the problem itself. A problem is never defined in isolation of solutions, since no problem can exist entirely of itself. A painter of the hard-edge school takes his easel not to a pastoral setting for inspiration but relies chiefly on
subconscious sources, just as a wildlife painter seeks his own sources outside the studio. Most people solve everyday difficulties using materials and methods at hand, so that the results have a kind of ad hoc appearance. In small-scale change, the resources of the community are often overlooked in the search for ideas. Existing patterns and information might, if presented in a meaningful fashion provide the necessary contingencies to the design solutions. A consideration of contingencies aids in the meaningful complexity of an environment; the designer exercises his choice and considers some portion of an endless list of considerations.

4.2 Selfconscious Design Approaches

The conscious design process deals with established or emergent conditions. The concerns are with solving the crises of today, ameliorating existing conditions, or anticipating and avoiding, the crises of tomorrow. Beyond the democratic methods, authoritarian planning creates fragments of utopias, usually taking the form of architectural design on a city scale. Examples are Chandigarh, Cumbernauld, and Brasilia.

Among the dominant planning approaches we can distinguish three: the Formalist Approach, the Heuristic Approach, and the
Operating Unit Approach (Boguslaw, 1965).

The Formalist Approach is characterized by the implicit or explicit use of models. In other terms, explicit may mean replica models, where field conditions are set up in the laboratory setting (Chapanis, 1961). Simulation techniques including computer simulation models are examples of systems that describe present conditions and attempt to predict emergent conditions. Implicit use includes symbolic models, ideas, concepts, and abstract symbols to represent the real thing. They use lines and arrows to symbolize information flow and diagrammatic blocks to symbolize major elements of a system. Mathematical models are a subclass of these symbolic models. The Archigram architectural group uses models derived from science fiction to industrial machinery. Paolo Soleri has adopted the machine as his city model (Jencks, 1971). Halprin (1969) has fashioned a curious amalgam of explicit and implicit modelling to simulate creative processes in the environment.

The Heuristic Approach is one that uses principles to provide guides for action. It is not bound by preconceptions about the situations the system will encounter. Its principles ostensibly provide action guides even in the face of completely unanticipated situations and in situations for which no formal model or analytic solution is available. In this sense, at least,
heuristic methods proceed from available information. Occasionally, these exalted principles take on a globality and vagueness reminiscent of Proudhon (1969).

This new notion of heuristic has been useful to describe the operational principles for computer programming (Boguslaw, 1965). So it is not surprising that a mathematician like Christopher Alexander would find this approach apt for the design of the urban environment, through the use of "patterns".

The Operating Unit Approach begins with people or environments carefully selected to possess certain performance characteristics. It belongs to the Behaviourist and Technologist schools, and is therefore strongly deterministic. The human units of Walden Two (Skinnder, 1948) fitted the requirements of the social and physical system created in that fictional utopia. In that case, the humans were explicitly conditioned to respond to a diminished spectrum of stimuli. In the more subtle social engineering of today, planners attempt to quantify or model the "expected" actions of the individual and thus provide for his "basic needs". Such attempts inevitably fall short of the task, and with the resulting environmental rigidity, the individual's responses are limited.
4.3 Contingency Planning

Environmental creativity of the kind described to this point has as its single goal, the creation of a dynamic urban design. This is a design process that is least concerned with ends, and chiefly concerned with process. The products of our present culture, as will be pointed out shortly, are mostly irrelevant to the creativity and dynamism of our civilisation. The successful communication of ideas and symbols, is the measure of a successful urban design process, and not the environmental end-product. Nicholas Schöffer (1969) has described the future city as one concerned with the ideas in art, rather than the products of the artistic process. In an age when information can be instantly conveyed, product generation becomes incidental to the process. The history of Western Art and architecture has been one of a fascination with the object; the apparent success of the object determined the artistic success, with the idea somewhere in the shadow. In the city we have been preoccupied with the building of a piece, organic or mechanistic. Buildings are regarded as static pieces of art, and always as physical objects. Aesthetic controls are concerned with the object, and the public is similarly educated and motivated.

In planning, many competing philosophies seldom find their full expression in any physical environment. Often as is
the case with the Formalist, Operating Unit and Heuristic systems, the approach is relevant only to certain situations or problems. The plan or proposal is usually most successful if the proponents choose among these competing philosophies and formulate solutions as they become apparent. That is to say, needs and goals are not defined initially so as to arrive ultimately at their solutions, but become apparent in the process (Granger, 1969), and the physical changes that result from this process of synthesis are happy by-products.

It would seem desirable from the point of view of creativity development to maximize the opportunities for action in the environment. We already know that the level of stimulation is raised in a complex environment; that is, an environment that is built up over time to a high degree of physical visual complexity. Possibilities for action also increase as the environment becomes more complex. The tabula rasa by its nature of being a void will not evoke ideas or possibilities, and the designers will inevitably seek contingencies with which to deal creatively.

Much urban redevelopment is conceived with a belief in a limited set of contingencies and static environmental conditions. For example, in the False Creek area of Vancouver, the City initially defined the study area to include nothing but the City-owned lands, and consistently expanded the study area to privately-owned, highly-developed contiguous areas, at the
insistence of various design teams. It was felt that good design would not be achieved in isolation, but would have to be a response or stimulus to the existing development. The process according to the inclinations of the designers was really ad hoc. At the same time, the City was carrying out a policy of creating a tabula rasa of the False Creek lands, removing the last vestiges of private control, and the symbols of past land use or design. Abandoned buildings were consistently razed, and the land bull-dozed to await the designers of the vision.

Reduction to simple terms and concepts, which has been previously identified as part of the conscious design process, also took place here. Successive reports became thinner and thinner, as complex decisions were reduced to the simplest questions (Vancouver Planning Department, 1971a, 1971b, 1971c, 1972, 1973).

The symbolic authority structure of spaces is beneficial to any casual observer or user if applied or maintained in moderation. The perceived authority of space has nothing whatever to do with relevant design authority. Any space whether public or private property, is potentially subject to any designer within the community. This gives the designer roles the autonomy they require for creative expression, and permits the implementation of multiple design in an ad hoc fashion, or succeeding alterations over time.
The salient point about good design is that it always proceeds from contingencies. At any stage in a development, one takes account of the then-existing conditions and plans appropriate strategies.

Present-day techniques of building conservation are often of necessity of an ad hoc nature. Besides the psychological benefits of conserving environments, such as the sense of historical continuity, of variety in the landscape and in land usage, there are economic benefits to be reaped as well. Large-scale change and upheaval is expensive and risky. The regeneration of older buildings for new uses can be economically sound, and the opportunity is available to "tack on" new structures to the old. Transferring the traditional F-S-R to adjacent properties is one well-known method of retaining one structure, while encouraging the development of adjacent properties. The loss of the Singer Building in New York was a blatant result of the inability of the planners to seize existing opportunities, to conceive of ad hoc solutions (Okamoto, 1969). A significant and useful building was raced to make room for the U.S. Steel building, while insignificant structures on the same property were torn down for a windy plaza. At fault was the heuristic of a rigid zoning formula. In this way contingency planning could permit the introduction of new design values as they become apparent.
"Infill" development has been championed by many as an appropriate strategy for the inner city, where development pressures receive no guidance from the existing legal mechanisms. "Infill" strategies could be guided by selection process based on community values.

Cataclysmic change in the Fairview Slopes area of Vancouver was a typical example of the inflexibility of controls and the lack of a creative process in the building of that environment (Elligott and Zacharias, 1973). Rampant land speculation and the destruction of existing buildings belied the actual abundance of open space for building. At work was a randomized process of selection, where any site was equally subject to redevelopment. The assumption is implicit in zoning, itself, which seen as an urban design mechanism, treats creation as random structuring of uncatalogued, unpredictable elements. This is about as valid a view as Darwin's theory of the process of natural selection as the means to evolution in organisms.

A distinct advantage of the grid street system of North American cities is that it fosters contingencies. New structures can be "plugged in", and open space can be built upon, without disrupting the existing physical form. Existing environments can serve as stimuli for successive changes; the plan is open-ended. There is a lamentable trend in large cities toward the breakdown of the orthogonal-modular grid through large-scale development.
While large-scale development must be accepted and welcomed in this day and age, we should seek ways of increasing diversity in design choices and differential rates of change. An increase in the number of elements in the design is necessary. Besides, immediate and continuous changes by the real users would permit creative involvement of "non-designers", and reconcile new projects with their old surroundings.

New towns provide perhaps the greatest possibilities for pluralist design since everything must be built from scratch. Unfortunately, town-designing up to now has been done by a simple expansion of architectural methods, resulting in a static master plan and a static city (Llewelyn-Davies et al, 1970).

The New Town described here, Milton-Keynes, makes use of the existing towns and natural landscape within its boundaries for use as contingencies: by preserving them, and blending them into the new city fabric.

The fixed elements have been arranged so as to allow the greatest possible scope for freedom and change. Since little has been pre-ordained, the thinking and planning process will have to be continued throughout and city's period of building. Housing is being built through a variety of means, so as to increase variety and choice, while permitting several design levels to participate. Growth directions are provided in every house, so that rooms may be added, joined or divided according to need and resources.
Urban design must pay conspicuous attention to the "unselfconscious tradition" (Silver, 1970) in architecture. It is defined in terms of that area which the architect does not design - 98 per cent of the world; or, if defined in terms of that area which is uninfluenced by the architect, the figure is reduced to about 80 per cent (Doxiadis, 1963). This does not mean that the environment is accidental, for all of it is and always has been consciously directed. Urban design must recognize "vernacular" design by making available an increased number of design opportunities, and by making all plans open-ended.

The remarkable rise of experimental architecture around the industrialized world has strong implications for the built environment (Cook, 1970). Many of the prototypes when built will explode our ideas of space, our conceptions of living and working spaces and in fact our images of the city. In order to accommodate these kinds of changes, we will have to accept ambiguity, complexity and conflict as basic attributes of the environment.

With this increasing pluralism in design, the role of the planner will increasingly be one of an integrator. His role in urban design can be enhanced by his involvement in the creation of problem-solving conditions.

Technology can be made meaningful through its casual use and manipulation in the environment. Yona Friedman's "spatial
constructs" exemplify ad hoc designs using modern technology, within the context of an established urban environment (Dahinden, 1972).

Joseph Weber's designs for a "high density city strip development" emphasize the dynamic quality of the city with its increasing rate of change. High-powered technology and industrialized building are adopted freely into the plan, while attempting to promulgate an atmosphere of growth, change and human involvement. Components can be displaced or replaced with a minimum of disruption (Dahinden, 1972).

An Archigram project for a "Control and Choice" dwelling also approached this problem of technology and humanness (Cook et al, 1967). The project was called "Control and Choice" following a magazine article which discussed the inevitable paradox between the anarchic and free nature of a responsive mechanism for the support of individual people, and the logic of optimization, standardization and economics which imply a control over what can be supplied for human needs.

However, technology does provide its own kind of flexibility.

While many theorists continue to propose refinements for long-range planning, technology has provided the individual with flexible living systems that deny any relation to the past or future. Mobile home parks are flexible in time and place, and
their components can be dispersed, collected, reorganized or moved across the province in a matter of days. "Instant City" has a number of implications for the individual and his basic needs (Greene, 1969). The standardized minimal design of the module itself provides continuity in an environment that may change from day to day. The creative experience of the individual is in his immediate environment, much like the American touring from the stable conditions of the automobile interior. Greene's proposal for an ad hoc nation-wide city that is never fixed in space, nor inextricably linked to other units, implies that the environment will always be changing, offering conflicts and challenges, unforeseen events and difficulties. The individual acts directly to change his immediate environment, simply by moving. This extreme mobility is a good argument for creating exaggerated diversity in the urban landscape, as people begin to exercise the increasing choices that are becoming available.

While the module may satisfy certain human needs very well, its use by many people raises some social problems. An increasing use of standardized building materials means that flexibility of choice will be raised on the micro scale, but the sameness of these structures on the macro scale will be an overpowering drawback. Therefore, we will have to introduce the anomalous situations that characterized our cities when design and aesthetic choice could be exercised on the macro scale. Conflict
and contradiction will not just happen, they will have to be designed.

4.4 Feedback Mechanisms

Feedback and feedback, analogous to the concept of stimulus and response, are integral to the ad hoc approach. Feedback makes it possible to develop new rules that recognize earlier successes, to improve already existing but less successful things, and to verify a well-tested model for the future.

The feedback mechanism is perhaps the most important ingredient to the planner's urban design recipes, since it provides the major source of contingencies. Planners are very anxious to know what it is people want in their environments. Yet it is immediately obvious that this sort of question requires 1) prior knowledge on the part of the respondent regarding the present environment and 2) possibilities for a future environment. It has been shown that planners may present alternatives themselves and have people choose between them, as trade-offs, with good response.

But from a creative point of view, this approach is lacking in three essential ways. First, it assumes that there is a finite limit to the achievement of one's wishes; that "you
can't have your cake and eat it too". Secondly, it assumes existing conditions in the minds of the respondents while asking for change in the responses. Thirdly, such an approach does not separate motivation from creative response.

In this question of response, we generally do not recognize the various levels of motivation in an individual but rather we assume a key word to act as a sufficient stimulus to a response. It is not very important to know what the response from the user is, but why it is he responded in that way: the "what" is the political question and "why" is the motivational, planning question.

In this respect modern marketing research tells us that opinion polls, question-answer surveys, and memory recall, are methods which evade the motivational response (Farrow, 1969). The results of surveys though they may be statistically sound, are limited by the experience of the respondent, the mind frame of the question, and the passive role the respondent is placed in. In a word such methods do not seek creative answers to questions.

The argument is offered with the proviso that consumer behaviour is precisely the same in motivational terms as environmental responsiveness. The level of complexity in the latter is obviously higher, which supports the conclusion more strongly that passive motivational techniques such as surveys are unsuitable for obtaining feedback.
The chief contention here is that monitoring can to some degree be done through direct observation by the researcher of the effects of design. This requires experimentation. Experimentation will at the same time widen the field of vision of the respondent and researcher. A successful experiment can have tremendous influence on groups and individuals.

This is the essential distinction between feedback mechanisms in operation today, and the type suggested by Silver (1972) and Lilienthal (1953). The introduction of new desires or values into the feedback mechanism automatically changes the process from a piecemeal operation or master plan into an evolving plan based on traditional and emerging rules.

The responsive environment is essentially the recreation of a natural communication system we lost sometime during the Industrial Revolution. The present environment tends toward both visual simplicity and extreme functional complexity. This double and opposite movement erodes our comprehension of objects. Since this physical manifestation is really a breakdown in communications, we must seek alternative processes to stimulate creative response.

Individuals in the designer role should have access to a broad range of materials, methods and ideas. Rather than develop an information exchange that attempts to define single, pervasive goals for development, the process should capitalize
on existing possibilities for a pluralist approach to design. Today's second machine age of cybernetic production offers the opportunity for a more responsive, individualized, differentiated environment.

The Signs/Lights/Boston design group were given the task of defining the information problem in that city, and making suggestions toward a better visual environment (1969). The information centre they created included a random access information retrieval system that selected and printed a take away card when any of the 120 question buttons on the face of the machine was pressed. Information on activities in the vicinity came from questionnaire responses and were displayed in the respondent's own words. Each activity was keyed to a grid location on a map. Slide-and-sound presentations offered various impressions and experiences of the city, as seen by private individuals and groups. A feedback mechanism allowed people's verbal reactions to the centre to be recorded, and the recommended changes effected in the centre itself. The information centre incorporated the idea that design is choice. Fragmented and incomplete information was collected in a meaningful way in a single location.

An information centre can be made useful to the urban design process, by making relevant information available to the homeowner, tenant, non-professional designer, and
professional designer, all involved in their own sphere of design.

Five types of information should be included:

1) current development projects and design proposals for the city
2) historical development of the city, character of local areas, the regional architecture
3) resource catalogue (computer searches file for materials and eliminates unsuitable items of information according to cost input, size input, design input, etc.)
4) methods catalogue, giving the uninitiated fundamental information on construction and design techniques
5) administrative procedure for design approval, by-laws, building codes, etc.

Items 3) and 4) can be provided through a filing system similar to the IBM system now being installed in many modern libraries. Information is called up and displayed on a monitor simply by punching the relevant "questions" on a typewriter keyboard. This kind of service in the downtown would bring important design information within the reach of everyone.

At the same time, a design exchange has the effect of gathering together the ideas of the community within a single, conceptual frame. One changes environment-building from a stochastic, linear process to a communally organized process.
Individuality and creativity are not sacrificed for participation but can benefit from interaction. Improving design sense in this way also enhances the individual's ability to make educated choices in other areas of consumer or producer behaviour. The purely design-oriented information complements the consumer function of information provided by retail outlets and cultural centres.

An important by-product of the centre is that it confuses public and private domains of action. All design action can be redefined as strategies for change based on a pluralist view of the environment, the community and philosophies of renewal. Design is ultimately the result of internal processes in the individual, and thus defies the artificial public-private dichotomy. In this light "user design" is often a retrograde concept. All individual, internalized creative processes can benefit from group interaction, from community interaction, and from some externalization of the design process. In the same way, "users" can learn from "professionals", as in the worker-manager relationship.

The creative function of the planner is in the design of the framework for other designers, and the coordination of plans, and the input of municipal energy and resources, when it is deemed necessary.

Experiments in urban design are another source of
feedback into the process. There have been many examples of "minimal malls" created through individual or group initiative, though always without the full deployment of potential design capability in the community. The "pilot mall" concept (Downtown Idea Exchange, 1968) describes a method by which local retail outlets can collectively improve the public space in front of their shops, and alter it according to the feedback received.

Communities of every size, and initiative from differing levels of concern have sponsored these spontaneous, ad hoc changes in the physical environment. In a small retail area off the Boston Common, a realtor spurred the local proprietors into the creation of an experimental pedestrian mall. Boston civic planners made the necessary provisions. The individual outlets on the street staged various promotions and events with commercial and non-commercial overtones. Changes have since been made to enhance and extend the original mall. Similarly, the city of Fort Worth staged its own experimental mall called "Downtown Futurama". This mall tested some future proposals for the downtown while providing an immediate opportunity for local and individual initiative in design.

It is important to realize that education is part of the design process. Adult education of the urban environment can be carried out through the mass media. Wurman (1971) gives
a compendium of contemporary examples of walking tours, architectural tours, community maps, and "urban observatories" that encourage public participation in becoming aware of urban design. Graphic, film, and computer techniques are also enlisted to make information comprehensible on more than a superficial basis; that is, information when conveyed in a clear visual form can create visual understanding, and thus be made applicable to design. Abstract information becomes concrete. Complicated becomes simple. Board games such as On the Buses (1973) serve to educate the participant on the workings of a mode of transport.

Tours can be taken one step further, not only providing the individual with the means to understanding, but placing a design tool within his reach. A tour may be prepared describing the subject, or what it is we want to learn, and leave the actual design of the tour to the individual. Ideas are raised in the abstract and the "tourist" must concretise them, make the tour and record it in some way. Design is then part of action.

In summary, we can re-iterate that statement made in Chapter 1; that an individual's experience of the environment cannot be separated from his actions in the environment. There is no linear, or circular process at work here. Education proceeds simultaneously with action and vice versa. The response
mechanisms - education programmes through the electronic media and field experience, information collation and retrieval systems, the ideas exchange centre, experiments in environmental design - interconnect but do not have an order of priority or hierarchy.
CHAPTER 5: THE CONFLUENT FUTURE

The creative themes of the Industrial and Post-Industrial Ages have been the dichotomies of polar opposites - science and art, art and life, individual and society, creativity and conformity, man and nature. In the accelerating change of the present age, a vastly increased body of knowledge lends credibility to a pluralist view of the individual's role in his environment. Discrete subject areas are dissolving into a metamorphic "soup", the cocoon state of uncertainty preceding the emergence of a new order. Metamorphosis is a creative process.

Rather than attempt to resurrect the design traditions of the past, or invent new orders prematurely, we would do better to seek a greater personal awareness of our environment, the constitution of our experience, and what we can do to make our presence in the environment meaningful. With accelerating change, and the determinants of purposeful change exploding beyond any one person's comprehension, we cannot hope to arrest movement with stable orders. Urban design as an orderly physical framework for growth limits the creative potential of the design process, while predicting the design future. The physical environment does not act independently except as individuals design it. Urban design must be a
product of the creativity of individuals within a community creative process. Less than this level of involvement in design will render the environment less meaningful, and the process of design more like random structuring.

In general in society, hierarchical structure, closed systems, and conscious direction are being replaced by ad hoc structure, open systems and unconscious direction. The urban design structure should provide the means for direct involvement with the environment. Design direction is nurtured through the development of a creative psychological state and the provision of information resources.

The learning approach to design in summary is characterized by:

- defined beginnings and undefined ends
- the creative drive of individuals as the motivating force
- internal ordering
- an orientation in time to the present
- an orientation in place to the proximate
- a pluralist view of participants
- respect for the individual's need for creative outlet
- respect for creative results, over structured outcomes
- the participation of every individual within his range of abilities
- fixed rules and adaptable strategies
- universal access to information
- learning through doing

Design action for the nurturing of creative potential is characterized by:

- incremental, ad hoc action
- open-ended, flexible designs
- complex orders
- an initial impermanency
- an incremental permanency
- richness of meaning in content
- richness of contextual meaning
- the signature of the individual
- a plan that proceeds and evolves with action
- the gleanings of past experience
- the perceptual problem-solving situation
- the metaphor and archetype
- an affinity with environment, natural and man-made
- the interrelatedness of the parts
- the integrity of the small part
- the part never being the whole
- the whole never occurring at once
- the mosaic quality of the product at any stage in its building

These characterize the emerging creative urban design process that gives meaning to the individual-experience-environment relationship.

Many aspects of the process already exist in varying forms in our world: there are creative processes operating in government, self-regulating systems, in architecture, in biological growth, in industrial management, in technological production, and in the dissemination of information (cf. Appendix).

The need for a viable design process for the urban environment becomes increasingly evident in our time. The need for beauty is all but universal, and Lawrence may very well be right in saying that "the human soul needs actual beauty even more than bread".

But more than the illusive concept of an aesthetically pleasing environment, we need to feel a oneness with the physical environment. The basic components of our life - birth, growth, change, decay, and death are all present in the innate design of the natural environment. Even creative, purposeful change appears to be present in nature as it is in our own world. Yet our designing process has lacked these essential elements, even as we attempted to ensure beauty, harmony, and meaningful activity. Perhaps the fault has been not with the results but
with the nature of the process.

Urban designing is more an art than a science. In order to make creativity an integral component of the urban design process, design must be integrated with the activity of city planning. Instead of attempting to specialize the design activity of planners, we should attempt to educate a design sense, or environmental awareness in all planners. This will result partly from broad education, varied experience, creative attitudes. The need for a generalized design practice is based in the belief that specialist planners will ultimately find their advisory function usurped by specialists from other field. In order to act as designers, planners must be involved in the designing activity of the city.

To this end they must begin to understand and question the origins for the most mundane, taken-for-granted aspects of the urban environment. Our culture is constantly being renewed in the physical environment. Students of urban design should attempt some understanding of the service station, the drugstore, the suburban home, the residential block, the home-to-work trip, the shopping ritual, etc. These elements constitute the physical environment as it exists and provide the contingencies for future change. The designer will have to invent a new language to be able to communicate the new understanding of the city. He will have to rely on direct experience for inferences.
It is also the designer's responsibility to disseminate urban design information.

The role of education is increasingly important in our society. One-third of the population is enrolled in school. The education system sadly lacks in programmes that orient the student to the urban environment. Tours and field trips that use a discovery approach are essential to widening the horizons of the participant.

In Chapter 4 an exchange centre was proposed. This is an initial step in recognizing the existence of purposeful design activity occurring everywhere in the city. The process lacks the meaning that a coordinated effort for information and idea exchange would generate. The existence of such a centre would itself generate news through the electronic media, newspapers, and journals, in this way expanding its immediate impact.

In general, we need to take a more casual, less pragmatic approach to the design of our cities. Every new development has traditionally fenced out the public while the almost clandestine building goes on within. Ways should be found to bring the public within the fence, including tours of the site, simulated tours of models, short courses in construction technique, public events in the incomplete structure. Cultural events were held on the Expo '67 site in Montreal prior to its opening, raising expectations of the completed fair and
enabling the casual visitor to observe the continuity of the construction process. Every new development should have the means of obtaining and disseminating feedback. In this way major new construction will once again take on ritual meaning for the city.

Experimental environments should become an on-going activity of art galleries or museums. Beyond an art form, self-controlled environments provide new information to the individual about his space perceptions and his personal needs.

Wrapping buildings demonstrates the meaning of an experimental environment. Planners should be actively engaged in making temporary changes in the streetscape, in lighting, use of colour, and landscape hardware. At the same time, individuals should be encouraged to involve themselves in the public space, by designing on a temporary basis. This is essentially the attraction of mediaeval market squares, which, though bounded by major public buildings, accommodated day-to-day, human scale changes.

In general planning must become involved in the transitory urban landscape, since it is through the casual or transitory that meaning is given to the permanent.
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Edward Banfield (1961) gives a detailed account of the
difficulties of making decisions in a major city. He shows that although the lines
of administrative and executive control have a formal hierarchical
structure, these formal chains of influence and authority are
entirely overshadowed by the ad hoc lines of control which arise
naturally as each new city problem presents itself. These ad
hoc lines depend on who is interested in the matter, who has
what at stake, who has what favours to trade with whom. This
second structure, which is informal, working within the framework
of the first, is really what controls public action. It varies
from week to week, even from hour to hour, as one problem replaces
another. Nobody's sphere of influence is entirely the control
of any one superior; each person is under different influences as
the problems change. Although the organization chart in the
mayor's office is a hierarchy with limited relations between the
parts, the actual control and exercise of authority is a lattice
with many relations between the persons concerned.

The formal structure for the design of our cities consists
of a limited number of official links between developer, architect and planner, but in reality, the lines of design influence are complex and informal. The real decisions are not made in the board room but over lunch; the great inspiration does not necessarily happen in the office but almost anywhere else.

The explicit hierarchy in the mayor's office finds its equivalents in the apparent structure of the city. No city element has only one relation to some other part, but each has a number of informal connections. Alexander (1966) describes the formal, conscious design process as a "tree", and the unselfconscious process as a "semi-lattice".

When we think in terms of trees we are trading the humanity and richness of the living city for a conceptual simplicity which benefits only designers, planners, administrators and developers .... In any organized object, extreme compartmentalization and the dissociation of internal elements are the first signs of coming destruction. (p. 55)

Traditional thinking about the design of cities has mistaken the ostensible structure as the picture of how the structure works. Plans suggest a hierarchy of stronger and stronger closed social groups, ranging from the whole city down to the family, each formed by associational ties of different strength.

In reality, there are no closed groups of people. Every individual has at least potential access to any public information or action, though the avenues are informal.

The difference between a conscious, visible decision-
making process and one that is unconscious and implicit may manifest itself as the difference between a central decision and social choice. The central decision is made by a representative who has filtered the best interests of groups involved or affected. His decision is a "solution" to a "problem". A social choice is made in an ad hoc fashion, through the independent actions of a number of individuals, who thus achieve a result. Problem and solution may never be defined. The competition of forces which do not aim at a common goal produces outcomes which may be more workable than any that could be contrived by a central decision-maker consciously searching for solutions in the common interest. Charles E. Lindblom (1958) has observed that while it is customary to think of the analysis of a policy problem as going on in the mind of one man or of a small group of men, it can also be seen as a social process. "Fragmentation" of analysis — i.e. analysis that goes on among many individuals or groups, each of whom approaches the problem from his distinctive and limited point of view — may be an aid to the correct weighting of values in a choice. The rules are defined by societal norms, whereas the strategies vary with the individual.

No matter how competent and well-intentioned, a decision-maker can never make an important decision on grounds that are not in some degree arbitrary. For this reason
centralized decision-making often lacks meaning to those individuals ultimately affected. In the social choice process, maximum freedom of action is given to the greatest number of people, so that action proceeds immediately from creative thought.

A.2 Self-regulating recreating communities

Sustained growth, traditionally believed to be necessary to the operation of a healthy economy, is out of favour. People in many communities are advocating industrial and population growth controls, so that optimum sizes can be reached or maintained. In most cases, then, optimum size is synonymous with a steady state.

What the anti-growth movement does indicate in a more positive vein, is the desire for self-control. This can be interpreted for the community as a whole and as a modus vivendi for one's individual life. In fact, the no-growth sentiment corresponds remarkably to the idea of a self-regulating system, where internalized rules of action control change and interaction with other systems (George, 1965; Tsypkin, 1973). A self-regulating system as applied to the social situation is a kind of democratization where the power of the ballot box is replaced by the power of internalized values, and externalized rules.
Inherent in the idea of a self-regulating system is a change in the scale of action. Since explicit external controls are replaced by internal controls, the implied changes must be at a smaller scale. The city regains its significance as a social entity when common lines of action and control must be evolved within the whole community. Each individual becomes responsible in an ecological sense for the environment of his experience.

Some social organizations are already beginning to incorporate notions of self-regulation. It has been noted that welfare systems are much better run from below, where decisions are relevant, than from above, where they tend to be costly and unresponsive (Seldon, 1967).

A.3 Creative potential in portable architecture

The architectural tradition of North America, apart from the conscious borrowings from Europe, is one of lightweight, serviceable structures that meet the average person's need for flexibility. Wood has been favoured as a quick and inexpensive construction material, permitting change more easily than industrial building materials. The house has always sat lightly on its terrain.
Today equivalents vary from Fuller's Dymaxion houses to self-contained, self-propelled campers. The mobile home is simply an efficient box on wheels. While it is not generally "mobile", owners add to the basic structure as they require more space. The potential of lightweight, minimal housing has escaped most social theorists and designers who are more intent on ministering to the every psycho-social need of consumers. Flexibility and the ability to react creatively are provided in a personal environment that leaves parts of the design programme to be completed ad hoc.

Jean-Paul Jungman's Dyodon is a realistic housing alternative to the tent. These pneumatic residential cells are cheap, and can be deflated and moved at will. Additional rooms can be added (Dahinden, 1972).

The nature of the modern house is not in the slight variations in structure or form, but in the gadgetry that it contains (Banham, 1965). Giedion (1948) long ago described the growth of technology in terms of the production of household gadgets, which have since come to characterize much of our architecture. The house is really nothing but a shell containing the gadgets that serve us in daily life - they constitute the environment that we can presently manipulate.

Cook (in Jencks, 1972) suggests a catalogue of "add-types" for the suburban environment-builder. In this scheme, the typical
developer-built suburb presents a uniform modularity of design and function that acts as the minimal structure for individual input. Such items as the bay box, deluxe bay, cage, semicircular bay, lean-to, etc., can be accommodated in the module plan, until the character of the environment has significantly changed. This sort of add-type catalogue would have a remarkable effect in disseminating ideas for change.

As consumerism expands to the living environment, individuals have the potential of controlling the quality of their immediate environments. What is lacking, perhaps, is an educated process of choice.

A.4 Creative biological growth

Neotony is a biological term meaning the gradual retardation of bodily development beyond the age of sexual maturation. In a kind of perpetual youth, a species can adapt to unforeseen circumstances, since it is never more than a 'child' (Koestler, 1967). By adapting incrementally, as circumstances demand it, the species does not close its options to further adaptation, or close the route to reversal. A species never purposefully makes a radical departure from its past action, since such action would be random and meaningless. Such an event would be a needless
effort and might possibly spell extinction. In its perpetual adaptation, the species remains forever young, in a constant state of rejuvenation. It never specializes the becomes fixed in a hierarchical or closed system, since specialization is an aging process.

Hingston (1933) describes the exploits of a wasp in crisis. He made a hole in a cell of the wasp's nest in a fiendish way, so that it could not be repaired from the outside. The wasp wrestled with the task for two hours, until night came and she had to give up. Next morning, she flew straight to the damaged cell, and set about repairing it from within; something she had never done before. Conflict in the wasp's work did not prevent it from adapting and learning from this unusual circumstance. One could speculate that the wasp could be 'taught' to adapt to a range of difficult conditions and improve its ability to survive and grow in its range of abilities. Most such learning tasks are performed by humans.

Neotony is a correct interpretation of Maslow's theory of self-actualization. Individuals maintain a perpetual youth and capacity to react and create, by performing tasks and being placed in unfamiliar or problem-solving situations.

Car manufacturers operate on the principle that obsolescence will occur in even the best car design, if evolution does not take place. The principle is that the automobile is a
relatively fixed order of functions, but these functions manifest themselves in individual component systems. They make use of already existing, standard components - chassis, brakes, etc. - then proceed by relatively small improvements or modifications of some of these - for instance, by re-designing the body-line or improving the cooling system, or introducing bucket seats. The car manufacturer operates by fixed rules but is guided by adaptable strategies.

All creative-problem solving in fact, is characterized by fixed rules and adaptable strategies.

Thorpe (1956) describes the nest-building procedure of a certain bird species as including several different action-patterns, and four different building materials. Each action and material conform to the rules for a particular stage in the building. The bird begins with some conception of what the completed nest should look like, and some conception of how each additional piece of moss or lichen will contribute to the ideal pattern. But actual construction requires ad hoc adaptation.

Fixed rules and adaptable strategies characterize all successful organisms in changing environments. Attempting to solve difficult environmental problems without a strategy will fail, as will a single strategy carried to completion. The correct action often does not become apparent until a start is made, learning is commenced, and therefore continuity is
established. The successful solution relies on the perception of contingencies as they occur or as they become apparent.

A.5 Job environment enrichment

Experiments in job enrichment for workers in industry have demonstrated the importance of challenge in the work and participation in management. Major work in this field has been done by Mayo (1960), Gellerman (1963), Maslow (1954), and MacGregor (1960).

A typical strategy for job enrichment in industry is described by Robert N. Ford (1969):

1. Give the employee a good module of work
   - pull responsibilities back down to this job level if they have been assigned higher up only for safety’s sake
   - gather together the responsibilities that are now handled by people whose work precedes or follows, including verifying and checking
   - push certain routine matters down to lower-rated jobs
   - automate the routine matter completely if possible
   - rearrange the parts and divide the total volume of work, so that an employee has a feeling of "my customers", "my responsibility".
2. Once an employee has earned the right, let him really run his job.
3. Develop ways for giving employees direct, individual feedback on their own performance (not group indexes).
4. Invent ways of letting the job expand so that an employee can grow psychologically.
Much of the theory has now become accepted practice in industry since it has succeeded in improving job satisfaction and productivity (Goble, 1970). Behind the pragmatism of job enrichment, there is a fundamental change occurring in our ideas of the purpose of work and leisure.

Management recognizes that all serious work or endeavour best organizes itself into semi-autonomous units, and the rules of the group are best evolved from first-hand experience. It is no longer enough for workers to control only the routine of the work, and many corporations now have workers organizing their own physical work environment. At Non-linear Systems, the time clocks were thrown away and salesmen's expenses were not accounted in detail (Goble, 1970). Semi-autonomous work groups at Non-linear and at Volvo, in Sweden have demonstrated that work can be meaningful if there is a sense of purpose, and a visible product of one's efforts.

Our cities will only become meaningful to the people who live in them when the product is a result of real design involvement by an increased number of semi-autonomous design groups and individuals. Greater quality and quantity of design production in the environment through a sense of autonomy among the user-designers, is a distinct possibility for the urban design process, if job enrichment in industry can be considered an indicator.
A.6 Creative potential of design

While the range of consumer products grows, the nature of production and design change also. Our notions of design and function have not really kept pace with technological changes.

Modern devices are becoming increasingly complex, and the purpose is entirely for ease and economy.

A kitchen stove is a combination of distinct systems that calls to mind not its working order, its functional complexity, but its external shape. It has an archetype. But there is no essential principle of arrangement for the systems inter se in an aggregation like a stove (Pye, 1964)

It is functional but its function has little to do with its design. The revolution in mathematical calculators is an example of this trend toward complexity and design freedom. The first calculators were clumsy and utilitarian; the box that contained the mechanism had to conform to the restrictions of the bulky parts. The modern calculator could conceivably be designed in the form of a thimble, a hairbrush or a pipe.

Although our gadgets have become more complex, miniaturization and other changes have made design a separate consideration. In fact, how the calculator fits in the hand of the user and its visual appeal to the user, are the most important design considerations of the digital computer.
In all design whether industrial or environmental, function is never the ultimate criterion. All seemingly utilitarian objects have ultimately been designed with direct reference to something other than function. Functionalist thinking says that the design of a device must be at its "minimum condition", but to say that every system or design should be at its minimum condition imposes certain limitations on its form (Pye, 1964); and also on its success with the users.

To say that an environment shall be in its minimum condition is as arbitrary as saying it shall be green. If the system is in any adequate condition then it produces its intended result whether it is green or not. The minimum condition is not more economical either. In houses, the workmanship, research and calculation needed to achieve the minimum condition will cost far more than the material saved. The best design will never be an expression of optimum functioning, not merely because experience of something is difficult to predict, but because design itself is not functional arrangement.

If science and technology provide us with the minimum condition, then the designer's role is a dimension apart. If urban designers are to learn from science, urban designers must not be scientists. The patent arbitrariness of design is the best reason for placing its control in the hands of many and varied individuals.
It is the bogus of the "minimum condition" that has turned all our urban design into an effort to remove discomfort and 'make things easier'. All design in industry is intended for consumer products, so that we cannot afford to take into account industrial design's more positive but less predictable aspects. Urban design does not need to be as predictable. Therefore, we can afford to be experimental both in urban design as a professional activity, and urban design as a public activity. Only the producer-consumer as an individual can fulfill all the needs of design adequately. Palliation will neither make us happy nor fulfill our needs. Creativity and self-expression must be the means to self-fulfillment.

Jencks (1972) describes the component nature of industrial design as an opportunity for design by private individuals of their environment. Almost anything one can design abstractly, can be built from parts, if adequate sources of information are available. The freedom is all in the design of the object and almost no work is involved in producing the component parts. If the information on resources and building methods were readily available in a useable form, such environment-designing could proceed on an urban scale.
A.7 Information Resources

In the history of technological production, one of the major purposes of advertising has been to expand the market, and increase public knowledge of particular products. All of the electronic media have been enlisted in this kind of information dissemination.

The idea of the catalogue is instrumental in gathering together ideas in a comprehensible form, for comparison. Catalogue-shopping is one good way to make the process of selection meaningful, by incorporating choice and comparison. Besides the single product consumerism of Eaton's or Simpson-Sears catalogues, there are others that provide an organized list of products in their minimal forms. Many of the items in the Whole Earth Catalogue or the Big Rock Candy Mountain Catalogue cannot be used except in conjunction with some other item. The catalogue explains the use of the object, the cost, and the source, but tries to place maximum self-sufficiency and power of choice in the hands of the consumer. Warshavsky's catalogues automobile parts for the custom car builder.

Other sources of information such as Wurman's Yellow Pages of Learning, and Making the City Observable, are also intended to organize particular resources so as to make them useful. They do not confer the ability to choose, but help
the consumer ask the "relevant questions" in order to get the product he needs.

Negroponte (1970) describes the possible use of machines by the architect as a designer of the environment. By employing modern information systems, relevant information can be screened out of a vast quantity available. At the same time, the architect can devote himself more fully to the relevant questions, the issue of design. However, while improving the information system for architects will no doubt be helpful, such systems can also be of benefit to other designers whether professional or private citizen.

Our bias toward localized information implies two directions for the proposed relationship between designer and machine. The first is a "do-it-yourselfism", where, as in the McLuhan (1965) automation circuit, consumer becomes producer and dweller becomes designer. The second is the professional designer's use of machines.

computer consoles installed in every home ... everybody will have access to the Library of Congress ... the system will shut the windows when it rains (McGarthy, 1966) Already catalogue-ordering can be carried out through ten-button touch-tone telephones. Each urbanite could ultimately involve himself with the design of his own physical environment by (in effect) conversing with his own needs. In this interaction, everybody would communicate with the architect, implicitly via the machine.
The enormous quantity of environmental information can only be made meaningful and useful if an individual has the time and energy to devote to its study or, relevant information useful to him can be selected. This is the most important use of electronic data collection and retrieval systems: that the design tool can be given the individual through appropriate education techniques. Simply having information at one's disposal is not sufficient. Some form of idea exchange, such as the one outlined in Chapter 4, will aid in the refinement of choice, and the improvement of design.

The ultimate effect of this revolution is to change information exchange from a disaggregated system where individuals choose only from available sources to a unitary system where every individual has access to the same body of knowledge. From an urban design point of view, all development may eventually become meaningful within the context of its material and design sources. An office building will relate to a single family home. Since every structure and space has a common source, they will appear unselfconsciously as modules in the urban landscape. This will promote a city-sense, a sense of place since the city is the product of a design interaction within the confines of that environment. The construction and design hierarchies are broken down by universal access to the design field of knowledge.