These included such dimensions as 'ability to concentrate', 'aggressiveness', 'response to affection', etc., and when it was shown that eleven from a total of thirteen such traits indicated the same pattern, they were combined into a single 'index of adjustment'. This was then related to the length and type of journey undertaken by the children and it was found that for both bus and walking journeys the adjustment of the sample progressively deteriorates with duration. The most revealing finding, however, was that children who travel by bus are more affected, time for time, than those who walk (Figure 3.5). This, together with supporting evidence, effectively ruled out a fatigue explanation. The hypothesis that provides a better fit to the results is that children who walk to school have two familiar socio-spatial schemata, the home and the school, which are well connected with a causeway of well-known, articulated territory which they perceive themselves as capable of crossing at any time and on their own volition. Bus children, on the other hand, have two quite separate schemata divided by a 'no-man's-land' which they cannot traverse at all from the time the bus discharges them until about six hours later.

Enough has been said, I hope, to persuade you that a profitable way to advance knowledge and to facilitate predictions from the built environment towards human behaviour is to include as mediators variables the organized inner representations of physical and social relationships which I have labelled socio-spatial schemata. These are relatively easily available for observation either directly or by inference and they do seem to reduce disorder in data and to add organization to our theoretical ideas.

But my main plea is that we should be thinking seriously about some kind of theoretical framework for our rapidly developing field and not necessarily about any particular one.
that observation can be made free from the interference of subjective judgements, preconceived ideas, and theoretical assumptions.

This would seem to me a strange notion for psychologists to hold, because it was psychology that first established empirically that: 'In receiving information from a given stimulus pattern we select from the total amount of information available...and from our own store of information. The receipt of information therefore involves making a judgment, but...we are unaware of the extent of our personal involvement in the act, tending to regard the information as given' (Abercrombie [2.3]).

This deals with perception in everyday life. But the point has also been long established in the logic of scientific method: 'Unless we identify observation with immediate, ineffable experience, we must employ hypotheses even in observation. For the objects of our seeing, hearing and so on, acquire meaning for us only when we link up what is directly given in experience with what is not' (Cohen and Nagel [2.4]).

Henri Poincaré, the French mathematician and philosopher of science was more forthright: 'It is often said that experiments should be made without preconceived ideas. That is impossible. Not only would it make experience fruitless, but even if we wished to do so, it could not be done. Every man has his own conception of the world which he cannot so easily lay aside. We must for example use language, and our language is necessarily steeped in preconceived ideas. Only they are unconscious preconceived ideas which are a thousand times the most dangerous of all' (Poincaré [2.5]).

Psychologists engaged in scientific work thus have at least two reasons for disbelieving that they can proceed on a purely empirical basis. If they are interested in logic, then a third reason may lie in Karl Popper's logical refutation of the very idea that one can proceed logically from observation to theories. He does this in one paper by logically exploring the possibility of constructing an 'induction machine' that, in a simplified 'world' e.g., of sequences of coloured counters, would be capable of performing inductions (e.g., formulating laws of succession through repetition): 'The argument sounds convincing, but it is wrong. In constructing an induction machine we, the architects of the machine, must decide a priori what constitutes its 'world', what things are to be taken as similar or equal, and what kinds of 'laws' we wish the machine to be able to 'discover' in its 'world'. In other words we must build into the machine a framework determining what is relevant or interesting in its world' (Popper [2.6]).

Disbelieving in 'induction', and therefore in empiricism (Popper [2.7]), (which he believes to be self deception on the part of scientists - a kind of idealistic post facto rationalization of processes which they naturally wish to make appear as 'scientific' as possible), Popper argues that science inevitably begins with theories, which are generated in ways similar to other human ideas, and that the proper place of empirical work is to test the theories out; or, more precisely, to attempt to refute them. Science thus involves imagination in generating theories and ingenuity in testing them; it proceeds by means of theoretical approximations that show a better and better correspondence with more and more observations (Medawar [2.8]). Popper also puts forward the beautifully simple idea that the difference between a scientific idea and a non-scientific idea lies in whether or not it is refutable empirically. This theory of science places a very high premium on making theoretical assumptions and premises explicit even in the physical sciences. In the human sciences, the question is even more acute and acquires a political dimension.

Empiricism came to dominate the human sciences, partly because people believed that this was the method of the physical sciences, and partly as a reaction against the determinist theories of the late nineteenth and early twentieth centuries (particularly the revolutionary determinism of the Marxists which distorted the essentially open-ended and antidogmatic perspectives of Marx himself). Empiricism quickly showed itself no less able to ingest social assumptions - being more dangerous because of its supposed objectivity and its essentially surreptitious introduction of social norms and purposes into scientific frameworks.

In my view similar dangers exist in our field, and this is another reason (as well as the scientific reasons) why we should try very hard at this stage to expose all our premises and assumptions to open critical discussion. We should recognize that carrying out empirical work without making theoretical premises explicit is the precise equivalent of accepting theory without evidence. We should recognize clearly that all empirical work has a theoretical base of some kind and that we will only be scientific if we put the whole theoretical base at risk in empirical work. If we do not do this then our research is likely to proceed in dazzling but irrelevant circles (Gombrich [10.3], Luckman [1.7], Eichenque [2.9] and Weinsten [2.10] present ideas relevant to the issues discussed so far.)

Are we working on untested premises? Architecture and psychology are coming together at a time when psychology has a comparatively long history as an empirical research discipline, architecture a very short one. This lack of balance is unfortunate because I think there is a rather obvious programme of work built into a situation where methodologically experienced psychologists turn to the built environment to apply their skills. It is based on the general proposition that recognized empirical techniques in psychology have taught us a good deal about how human beings work and that they may be applied, more or less as they are, to throw light on yet another field of human involvement - the built environment.

More specifically the proposition (the hidden premise of architectural psychology) runs something like this: we want to understand the artifact/people interaction; so first we must investigate human responses to environment, treating them as isolable dependent variables, and establish parameters, scales, dichotomies, etc. When we have progressed far enough with this, we can reverse the process and treat buildings as the dependent variables and do a similar type of job. The result of the whole exercise should enable architects to make decisions based less on intuition and more on objective data.

I see this as a kind of package-deal theoretical framework which architects are trying to buy from psychologists, some of whom are only too anxious to sell. With it comes an assortment of sub-premises dealing with 'attitudes as determinants of response' and 'the richness of verbal response' and a host of others too numerous to mention.

To my mind, this set of ideas makes a number of presuppositions (which are never disproved because no-one sees the need to make them explicit): that, for example, the people/artifact system of environment is static rather than
volatile; that we need not look far outside the individual's inner self for causal factors; and that the researcher is detached from his subject; and that the whole system works in a rather mechanical and predictable way.

As an explicit set of theoretical premises, to be refuted or supported by empirical work, I would not object to this although I believe it to be inadequate and in some respects perhaps wrong. Left as an implicit set of premises, it is positively dangerous and could actually do harm to the environment when, as is inevitable, political use is made of the 'findings'. Dazzled by technique, we will lose sight of the possibility that the premises which have largely determined the findings may do violence to certain basic characteristics of the artifact/people interaction which can, I think, usefully be discussed logically prior to empirical work.

Problems of the artifact/people interaction as a field of study

I think we can examine both our basic premises and some of the problems of the artifact/people interaction by trying to answer four questions: (1) what kind of field is it and, in particular, what is the effect of time on it; (2) what is the researcher's relationship to it; (3) what kind of knowledge are we aiming at; and (4) are our methods consistent with the three above.

1 What kind of field? The main problem concerns the effect of time on it. Does it remain reasonably stable over time, or is it dynamic? If it is dynamic, does it tend towards homeostasis, like a human body in relation to its immediate physical surroundings? Or does it develop and constantly evolve new forms and new dimensions of itself, as, for example, in biological evolution? If it is a mixture of all three, in what respects is it each? (Buckley [2.11] and Charbonnier [1.8]).

Given the premise that the artifact/people interaction constitutes some kind of system, part of the answer to these questions is self-evident. As far as artifacts are concerned, it is clear that forms (e.g., very large cities) which exist now, did not always exist. That which did not exist cannot have been experienced. Therefore, at least some new dimensions of experience have evolved together with new forms of artifact, and presumably will continue to do so. The system is therefore developmental, in at least some parts of its major aspects. Although we may well argue as a result of empirical work that human response to built artifacts has certain basically stable parameters it would clearly be a mistake to assume either the stability or the homeostatic tendency of the whole people/artifact interaction in our theoretical premises.

2 What is our relationship to it? Are social scientists detached observers of people? Or do they automatically establish relationships with the subjects of study, and affect them simply by studying them?

There is a real problem here. A great deal of recent work by a few American psychologists like Rosenthal (Friedmann [2.12]) has shown the staggering degree to which the conduct of experiments can interfere with the subject under study. I do not think this can be discussed simply as 'experimenter effect'—one more problem for the psychologist to deal with in his experimental work. It is a much more fundamental and logical problem for human sciences. It can be set up like this: in physical science the value of experimental tests lies in their repeatability; in psychology it can be shown that the presence of the observer affects the subject under observation; in

Sociology it can be shown that the existence of a class of sociologists affects the path of development and experience of those societies; at all levels in between the same holds true; the experience of being studied is thus always an accretion in the total experience of the subject of study and may be expected to influence behaviour; from this it can be inferred that, in the human sciences, experiments or observations are, in some degree, never quite repeatable.

The view of the ideal relations between observer and observed being comparable to those that are thought to exist in physics, that does not hold water. Involvement is inevitable. It is first a matter of whether we recognize it or not, and whether or not we try to make it serve a conscious purpose. This problem has received a good deal of attention recently (e.g., Goldmann [1.9]). Architecture, an intellectual activity of which the result is always action, may suggest a possible answer, e.g., by psychologists aiming explicitly at a creative role in designing better environment.

3 What kind of knowledge? Do we believe that the 'knowledge' we may arrive at will have a deterministic character, i.e., that we will be able in time to establish chains of causality which will enable us to predict the outcome of unknown environmental situations? Will it enable us to make probabilistic predictions? Or do we believe that certain aspects of the people/artifact interaction are undeterminable because it is open-ended, volatile and constantly evolving? Or do we believe that each of these is true of some aspects? If so, which? Taking these questions into account, are we aiming at understanding specific states within the interaction, or how it evolves (see Sorokin [1.10]).

4 What kinds of methods? How far do we believe that isolating variables can help us experimentally where interaction with other variables in a real situation could easily make nonsense of the experimental results? How can we at least evolve a compositional methodology (treating variables in the complex combination in which they occur in real life) side by side with the more accessible traditional one? (See Simpson [10.4].) Is there any kind of data that measures a whole response to environment?

I believe that if we can answer some of these questions we will be well on the way to making our premises explicit.

A basic definition

Can a framework be outlined that would take the questions discussed above into account? If it could, it might start from a definition of environment. The term 'environment' implies two things: that there is a set of phenomena, facts or things, and that they are experienced. In the built environment we have on the one hand a set of physical facts (a physical system); on the other, a system of human experience of them (an experience system).

The term also implies that, in some sense or other, the two can be treated as forming one system. In dividing it into two, therefore, one should keep in mind that our chief interest is in the links that make the two into one.

Man is an environment-modifying and, eventually, environment-transforming being. The basic process in this transformation is action, resulting from deficiencies revealed by experience; once physical action is taken, it leads immediately to a new experience which, in turn, may generate further action. The two parts of the environmental system (people and things) are thus linked in a positive or active sense

27
by action, and in a negative or reactive sense by response and adaptation.

In its historic origins, the basic process of environmental transformation is experience — action — experience (E-A-E). Today, architects and others are specialists in certain complex categories of action, and they operate on behalf of others in a pattern action — experience — action (A-E-A). They do not have a monopoly of action. Buildings are not once for all products which do not alter significantly from completion to demolition. Like towns they are subject to a constant or intermittent series of actions of different types, by different people, for different reasons, and this continues to follow the basic E-A-E pattern.

We can suggest the following: the people/artifact interaction is a basic process of built environment and leads by modification to transformation; it has the character of a dialectical adaptive system (i.e., man adapts his environment and then adapts his experience to what has been created), a system whose future cannot be known: the system as a whole appears volatile (because it is changing all the time) but may have some relatively stable parameters, although we do not yet know what these are.

Motivation
All human action on environment is a modification of what already exists. This is no less true of what architects and planners do than of what individuals do. A new building or a new town is not a new environment, but a modified one: first, because the larger scale environment within which the ‘new’ one is created continues to exist and form a dimension of experience and also because experience is always continuous in some sense, i.e., people bring their previous experience with them to a new situation.

The link between experience and action (a decision to modify) is motivation. Motivation is therefore a principle category in the dynamic of the system. I suggest it can be generalized into a simple scale. At the top of this scale of motivation is the removal of severe (life-degrading) stress; next the removal of slight stress apparent over time; then the maintenance of equilibrium (after decay, etc.); below that life enhancing (stress) (efficiency, pleasure, etc.) and at the bottom, a trip (life-enhancing in itself).

This scale can account for the probable historical origins of building (removal of the severe stress of the elements, presence of wild animals, etc.) as well as the everyday processes that still go on all around us. The lower parts of the scale include the development of the idea of buildings as cultural objects.

If the scale is roughly right, then it can be inferred that the system we call man-made environment is not in its totality geared towards homoeostasi (although in parts it is), but perhaps from the top parts of the scale towards the bottom parts. That is, from the removal of stress to the enhancement of life. This does not mean that it is successful or that it progresses by rational steps: the opposite is clearly the case. But perhaps it is the constant disequilibrium implicit in this scale that generates the developmental nature of the whole system.

The people/artifact interaction
There are some interesting differences between the ‘physical system’ and the ‘experience system’. In the first place, the physical system is subject to normal process of entropy (the tendency towards disorder or formlessness), in that it decays if it is not subjected to a programme of action aimed to prevent this.

The experience system does nothing of the kind. Often its tendency seems to be in the opposite direction. Once basic stresses are removed, a given physical system, partly through action on it, and partly through adaptation in experience itself, becomes an increasing source of life enhancement by becoming a tangible framework for associations, social relationships, memories and perhaps also a very fundamental kind of stability. In other words, human experience of environment in itself tends to move towards life enhancement on its own. This realization may help us to understand the apparently very high degree of human adaptability to environment.

We could hypothesize from this that a natural tension exists between the physical system and the experience system in that they run normally in opposite directions (you stay in the East End because you like it in spite of decay) until a critical point is passed and the entropy of the physical system gets the upper hand, or another environment holds more promise of life-enhancement (you move).

Strategies for research
It was suggested above that the basic process of environment was (a) human experience showing up deficiencies, (b) action to remedy them and (c) new experience: E-A-E; and that architects were specialists who act on behalf of others on a pattern A-E-A. Because experience (the middle E) is not personal to them, they have, to a considerable extent, lost track of it. They try to overcome this in two ways, first, by trying to find out about the middle E before designing (user requirement studies); and, second, by feedback from buildings in use. Neither has been very successful, probably because the 6% fee scale strictly limits the resources that can be given to it. Supplying the missing E is now seen as the task of research, hence the tendency to involve human scientists in architecture and the increasing orientation of architectural education towards the human sciences.

A major task of research, and the principal task of architectural psychology, is to try to supply the missing E. We are then faced with the problem of the best strategies for doing this, and psychologists naturally begin by applying known techniques of measuring directly to experience.

I think we may discuss the usefulness of this by dividing experience into two basic types: basic physiological and psychological responses which can be generalized over large numbers of human beings in terms of limits of stress, and on the basis of probabilities: and a much wider range of perceptions, constructed to a much greater extent out of what the perceiver brings to the perception as well as what he perceives, which are of a much more indeterminate nature and perhaps not reducible to probabilistic statements.

The first group seems on the face of it much more accessible to measurement by available psycho-physiological techniques, at least as far as the limits of stress are concerned. But whether or not with such techniques we can get very much further than the limits of stress is doubtful, because the factor of adaptation and resilience among human beings seems very powerful. When we compare acceptable minimum standards for all kinds of environmental factors in different countries we find that they are absurdly different, and not
related in any clear way to relative wealth or industrialization (Rapoport and Watson [4,1]). In any case, this may not be very helpful, because buildings do not on the whole produce extreme stress, although they certainly seem to produce stress. Also, I imagine that psychologists (except those who are satisfied that psychology should be a branch of physiology) will find much more rewarding problems higher up the scale. Even so, the study of extreme stress could have the useful function of laying down a certain base-line for our studies.

The interest and the difficulty of environmental psychology really comes with the second group, which to my mind is connected with the bottom four categories of the scale of motivation described above. Here we are dealing with a multiplicity of perceptions which, apart from being held in a delicate and shifting balance in any one person at any point in time (also interacting constantly with factors which have nothing to do with physical environment) can also vary with different groups, societies or cultures, as well as from one individual to another. Moreover, even the same individual is likely to shift over time, and may do so quite rapidly depending on the kind of activity he is undertaking. Also we have the unknown variable — past experience and its contribution to perceptions.

From the point of view of measurability by accepted experimental and fieldwork techniques, which involve the investigator in some kind of interaction with his subject, we have the profound problem of 'experimenter effect' and the non-repeatability of experiments.

This suggests to me that as we move away from the limits of stress, then, from the point of view of measurability by accepted techniques and prediction in terms of probabilities, we are dealing with a more and more indeterminate system, whose capacity for future development may well surprise us (see Page [3,1]).

But this, to my mind, is only true if we are trying in our research to describe the people/artifact interaction as it is, as opposed to how it works, and particularly, how it changes. And here I think a type of data is available which relates to how it works and how it changes, and which is so far comparatively unexplored — I mean the action that people (and combinations of people — groups, organizations, etc.) take on their own environment to make it conform to their needs and wishes.

There are disadvantages with this type of data: in particular, it raises problems of interpretation, and it is incomplete — people cannot always act effectively or quickly to remove stress and instead may adapt and be unaware of any loss in the quality of life — as apparently they adapt to the sound of jets around London Airport, which I find intolerable.

The advantages seem to me to outweigh the disadvantages: it is physically measurable and recordable; it does not shift under study; and it indicates a whole response in a real situation; it presumably results from all types of motivation; and it can be supplemented by other types of data, which would acquire a new value by being related to this firmer base of action data. Moreover it is in some way a part of the basic process of environmental modification and transformation.

Because of this, it seems to me to have a very important type of flexibility from the point of view of research: on the one hand, it can be applied at a fairly simple level as feedback from one building to the next to ensure improvement; on the other, it can be stretched to a much more general systematic and specialized level, and contribute to a morphological study of environments of all types and levels of magnitude. It can also be given a historical dimension, because evidence of the past remains all around us.

It is the study of environments in use, of buildings as objects on which people act and contribute, alongside architects, to the process of environmental modification and transformation that I take to be the essential subject matter of architectural research. Architecture, I believe to be a science of artifacts, not a social science, but I believe also that there is a rich field of human study through the study of artifacts.

A possible programme for architectural psychology

This suggests to me certain very important tasks for psychologists in environment:

1 Try to develop techniques of studying people through objects, which can be measured without our affecting them, and learn how and why people modify and change their environment; at the same time trying to find out if there are clear relationships between verbal response and action.

2 Forget about 'optimization' and help architects to understand environmental stress and, in particular, the limits within which adaptation over time can be successful. This should be based on real rather than experimental situations, not least because technological innovation in this field (the 'what we can do') has its own momentum and will always tend to outstrip the 'should we do it' aspect. If we do not do this, we will continue to have a situation rather like medical research without autopsy or pathology.

3 Try from this to develop techniques which will enable us to see the stress in simulations — designs, models, analogues, performance tables etc.

4 Get involved in design so that hypotheses can be tested by that marvellous available instrument, the real building.